BBC · MASTER · ELECTRON · ARCHIMEDES DECEMBER 1989 £1·50

# BBC ACORN USER



COPY CAT CODE
Arc 68000 emulator

YOUR EVERY MOVE
Keystroke recording

R140 REVEALED
Unix for the people

LITTLE LETTERS
Kids' wordprocessors








## KNITWARE
Woollies from screens

WIN A COMPLETE £3000 DTP SYSTEM

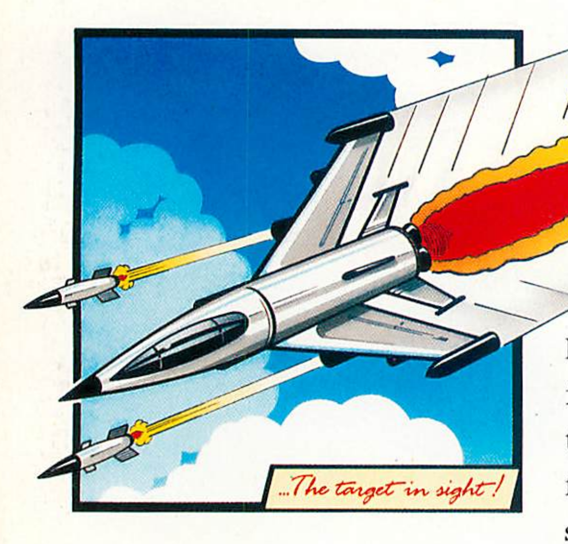


See inside for details



# INTER DICTOR

"I HIT THEM AT FULL THROTTLE...




...NOW I'VE GOT TO BLAST MY WAY OUT"

It was getting hot, a couple of SAMS *(Surface to air missiles)* had taken out my escort. I'm on my own.

Going in low was my only chance, got to get under the radar cover. I banked right into the valley basin and started to follow the river, the target could only be minutes away.

*BANG!!!*

Explosion right in front of me, I yanked the stick hard right, I hadn't expected flak this low. I had to take out the *ack ack guns.* Weaving I flipped off the safety clip and squeezed the trigger.

All I could hear was the deafening roar of *30mm cannon fire,* I watched the tracer burn down to the ground and pop the ack ack like crackers. The bridge was getting closer, over or under? Over and radar would pick me up faster than I could say... Fast, Under and, well, I might not make it.

Some choice, I went under and... I made it, straight into a hail of cannonfire from an enemy patrol fighter, I pulled the stick all the way back, he couldn't match my climb, before he knew it I had dropped on his tail and seconds later two of my *air to air missiles* had ripped him apart... Eat that sucker.

They were throwing everything they had at me now, I was on top of them, I went in on full throttle, they didn't know what hit them.

Five full passes, sure, I got bruised, but nothing compared to the carnage on the ground. Spires of smoke, earthshattering explosions. I had pumped everything I had into them, now I had to blast my way out.

*Interdictor* is the ultimate in realistic flight simulations. Giving you total control of a high performance modern jet fighter.

It runs on all Archimedes computers with at least 1 MB of memory including the A3000 BBC Micro. At your disposal is a breath taking array of graphics, faithful in almost every detail to a genuine combat mission.

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Archimedes 3000
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1 Meg upgrade
PLEASE RING FOR SPECIAL RATES

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Branded £8.25 for 10
Unbranded £7.25 for 10

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| Model | Draft | NLQ | Price |
|---|---|---|---|
| 1209 | 168 | 35 | £205.00 |
| 1709 | 240 | 50 | £384.00 |
| 1224 | 162 | 45 | £224.00 |
| 1724 | 216 | 60 | £599.00 |

## MAIL ORDER

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|---|---|
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| 420/1 | £1699.00 |
| 440/1 | £2499.00 |

PC Emulator (£50 with system)

1 Meg upgrades £145.00

## PRINTERS

**SEIKOSHA** 9 pin: 80 Column

| Model | Draft | NLQ | Price |
|---|---|---|---|
| SP-1801A1 | 100 | 16 | £114.00 |
| SP-1200A1 | 120 | 19 | £135.00 |
| SP-1600A1 | 160 | 27 | £192.00 |
| SP-1350A1 | 300 | 50 | £321.00 |
| 132 Column | | | |
| MP-5300A1 | 300 | 50 | £411.00 |
| MP-5350A1 | 300 | 50 | £446.00 |
| 18 pin: 1 year on site | | | |
| BP-5420FA | 420 | 96 | £1157.00 |
| SBP-10A1 | 800 | 200 | £2220.00 |
| 24 pin: 132 Column | | | |
| SL-80A1 | 135 | 45 | £228.00 |
| SL-130A1 | 178 | 60 | £403.00 |
| SL-230A1 | 277 | 92 | £591.00 |
| **PANASONIC** 80 Column | | | |
| KXP 1081 | 144 | 28 | £130.00 |
| KXP 1180 | 192 | 38 | £178.00 |
| 136 Column | | | |
| KXP 1592 | 216 | 45 | £266.00 |
| KXP 1595 | 288 | 61 | £368.00 |

## HYUNDAI

| Model | Draft | NLQ | Price |
|---|---|---|---|
| 80 COL HPP 910 | 216 | 37 CPS | £145.00 |
| 80 COL HPP 1810 | 240 | 100 CPS | £212.00 |
| 136 COL 920 | 216 | 37 CPS | £230.00 |
| 136 COL HPP | 210 | 100 CPS | £277.00 |

## JUKI

| Model | Draft | NLQ | Price |
|---|---|---|---|
| 55 10(P) 80 COL | 180 | 30 CPS | £141.00 |
| 7100 2601 BE | 288 | 96 CPS | £467.00 |
| 7200CP 24 WAE | 324 | 108 CPS | £1167.00 |

## EPSON 80 COL

| Model | Draft | NLQ | Price |
|---|---|---|---|
| LX 800 | 150 | 25 CPS | £224.00 |
| FX 850 | 200 | 40 CPS | £369.00 |
| EX 800 | 250 | 50 CPS | £506.00 |
| 132 FX 1050 | 264 | 54 CPS | £482.00 |
| 136 EX 1000 | 250 | 50 CPS | £667.00 |
| 136 PFX 5000 | 833 | 80 CPS | £1367.00 |

## LASERS

| Make | Model | PPM | Price |
|---|---|---|---|
| Panasonic | Ex-P4450 | 11 | £1436.00 |
| Canon | MK IV | 4 | £1080.00 |
| Epson | GQ5000 | 6 | £1440.00 |
| QUME | Publisher | 6 | £2376.00 |
| QUME | Publisher II | 6 | £1228.00 |
| QMS | Postscript | 10 | £3422.00 |
| Brother | HL8 | 8 | £1617.00 |

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| Make | Model | Special price |
|---|---|---|
| Philips | 8833 colour | £183.00 |
| Equivalent to 8833 | | £165.00 |

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A500 computer, mouse & modulator.

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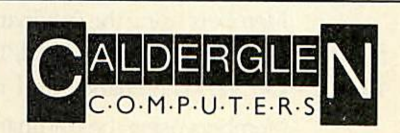
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# BBC ACORN USER

ISSUE NO 89 DECEMBER 1989

## COVER






Cover photograph by John Barlow

## FEATURES











## REVIEWS








## REGULARS



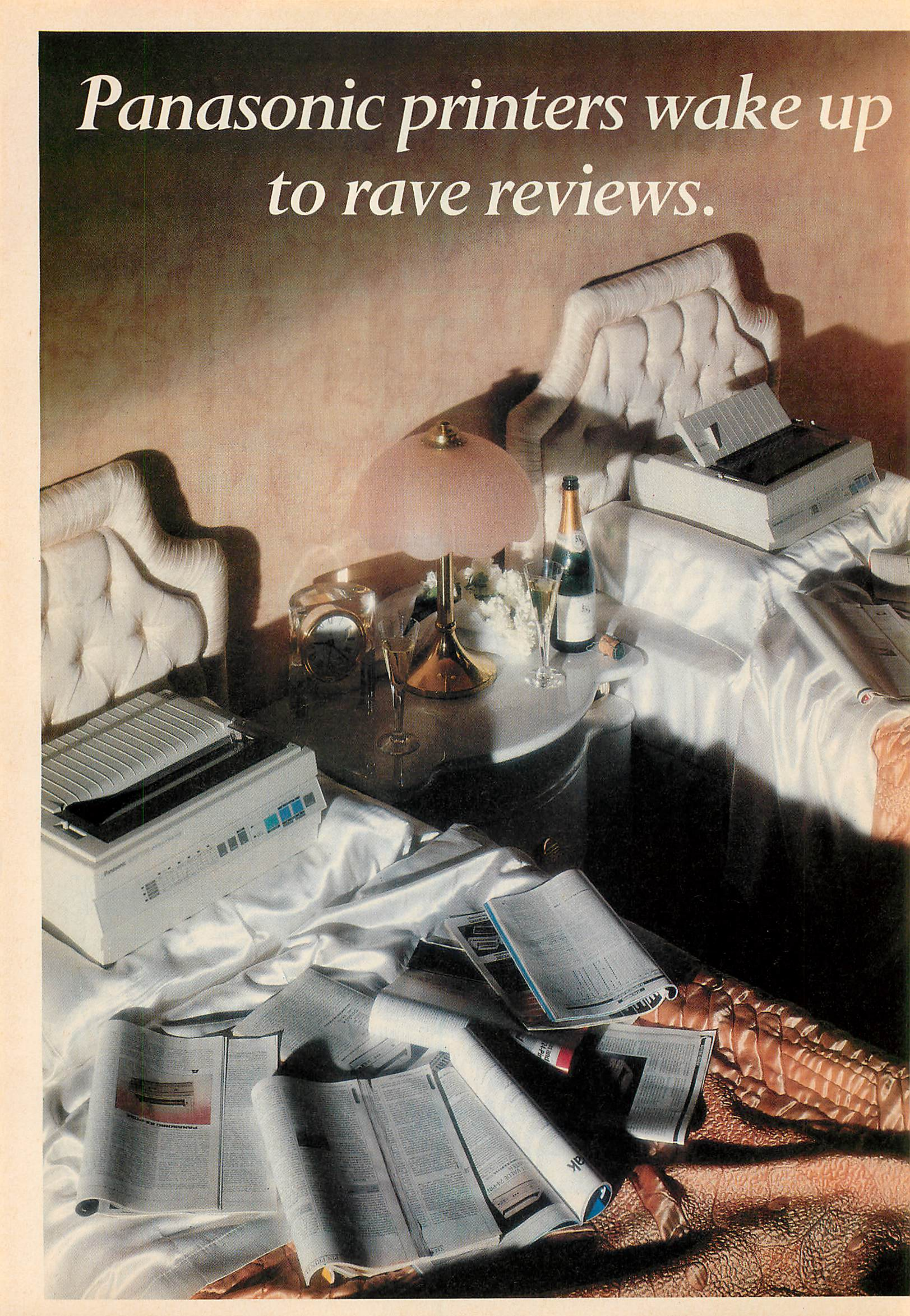
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Panasonic printers wake up to rave reviews.

# NEWS

## Mach Technology

Mach Technology has advertised software and hardware for Archimedes computers in *BBC Acorn User* as well as several other magazines for the past six months. It appears, however, that the company has failed to deliver goods.

We have been unable to contact the company and are advising readers who have ordered goods to cancel their cheques. Redwood Publishing has suspended all advertising for Mach Technology in *BBC Acorn User* and *BBC Educational Computing.*

We will, of course, keep readers informed of all developments.

■ If you have sent money to Mach Technology and not received your goods, we would like to hear about it. All details will be forwarded to the fraud squad in Stockton, who are looking into the matter. Please mark your envelope 'Mach Technology Investigation'.

## Panda music

Panda Discs has released a disc of music for the Children in Need charity.

At £5 including postage and packing the disc contains over a dozen pieces of music for the Hybrid Music 5000 system. Tracks include the original music file for the theme to the BBC's *The Software Show* plus a song composed for *Children in Need.*

Panda Discs' music programmers have agreed that all royalties will be added to the proceeds from the disc which will be available after the main event in November.

Panda Discs is at Four Seasons, Tinkers Lane, Brewood, Stafford ST19 9DE.

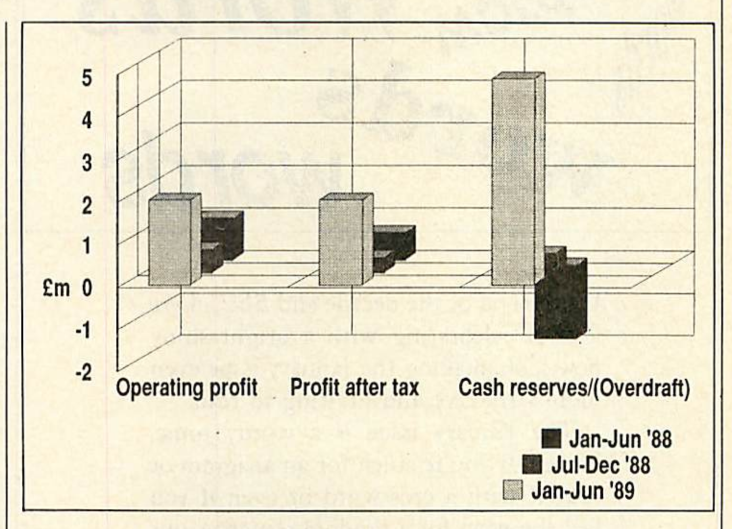
# Acorn profits grow in 1989

The half-year financial results for Acorn Computers reveal the company is doing well.

Profits after tax for the first six months of this year almost trebled from £0.71m to £2.05m. Revenue rose to £22.1m from £20.5m and for the first time in years Acorn earned interest – £30,000.

Of particular note is the company's cash reserves. At the end of June 1988 Acorn had an overdraft of £1.8m. The cash balance at 30 June 1989 stood at £4.9m.

Operating profit fell from £1.05m down to £0.85m, however the company received £1.2m from Olivetti Systems and Networks in 1989, for the granting of certain European sales and marketing rights related to a development project which has been undertaken by Acorn.




Acorn cites consistent sales of the BBC Master 128 and the BBC A3000 as major factors to the company's success. Acorn is on (0223) 245200.

# Irish reaction positive at launch of A3000

The BBC A3000 has officially been launched in Ireland.

The launch was held on October 10 by Bytech Ltd, Acorn's sole distributor in Ireland. 140 educationalists gathered at Dublin's National Concert Hall to hear representatives from Acorn give presentations on the company and the A3000.

At IR £1,065 (ex VAT at 25 percent) for an A3000 and colour monitor the price does not break the psycological sub £1,000 barrier. However, Niall Andrews, MD of Bytech told *BBC Acorn User*, 'I am surprised at the level of interest already shown in the A3000 as a serious home users machine.'



One teacher *BAU* talked to was very impressed with the technology and speed the A3000 offers, but said 'with no IT funding from the government (unlike the UK) it's down to each school to raise the finance which many simply cannot do'. Bytech is on Dublin 953767.

# NEXT MONTH

## DECK THE HALLS, ETC

Words Words
words
sproW Words
Words
words words

It's the end of the decade and *BBC Acorn User* is celebrating with a bright shiny new look, making the January issue even more attractive and inviting to read.

The January issue is a wordy tome, indeed. If you're stuck for an anagram or caught with a crossword or even if you feel the need for a random sentence, our selection of word game programs will solve all your problems and while away the quiet hours between the Queen's speech and yet another Christmas showing of *The Sound of Music*.

Also, in topical vein, next month sees the *BAU Diary Manager* program to produce diaries of every shape and size – all automatically equipped with those troublesome holiday dates.

And if this wasn't enough, the January issue looks at computer art in education, the low down on writing foreign and scientific documents, modems for your Beeb, samplers for your Arc and much, much more.

Round off Christmas with the January issue of *BBC Acorn User* – in the shops on 14th December.

January 1990
Monday 1
Circumcision of Our Lord (Hol)
Think up a hangover cure

January 1990
Monday 1
Circumcision of Our Lord (Hol)
Think up a hangover cure
Tuesday 2
Back to work!
Wednesday 3
Write thank-you letters!
Thursday 4
Only one week to go to the February issue of BAU
Friday 5
Work out how many shopping days left until Christmas
Saturday 6
Epiphany of Our Lord
At last, a holiday!

January 1990
1 M Circumcision of Our Lord (Hol)
2 T
3 W
4 T
5 F
6 S Epiphany of Our Lord
7 S
8 M
9 T
10 W
11 T
12 F
13 S
14 S
15 M
16 T
17 W
18 T
19 F
20 S
21 S
22 M
23 T
24 W
25 T Conversion of St Paul
26 F
27 S
28 S
29 M
30 T
31 W

# The day at Watford

Around 1,200 people attended the Autumn hands on open day at Watford Electronics on Sunday October 8.

According to Nazir Jessa, MD of WE 'the day was successful and I look forward to the next one in January.'

Computer Concepts demonstrated a pre-release version of *Impression* which should be available early next year and Minerva was showing off its new *Multistore* database which allows several files to be linked together. Colton Software was also on hand to show off *Pipedream 3*.



*BAU* editorial staff were on hand to provide technical assistance and sell copies of the magazine. We would like to thank all of you who attended.

# PC show report

Although Acorn didn't demonstrate anything new at the *Personal Computer Show*, there were plenty of attractions at the Acorn Village which consisted of over 17 stands.

Ace Computing was demonstrating its Risc OS version of the 3D graphics system, *Euclid* while Computer Concepts previewed its DTP package *Impression.*

Games wise, Cambridge International Software in the leisure hall had *Confusion*, *Super Creations* and *Pro-Copier*, while *Interdicter* from Clares and *E-Type* from the Fourth Dimension are two arcade games which prove the Arc is as good a games machine as any. TFD also previewed a submarine simulator game for the BBC and Arc and Clares was showing off its *Armadeus* music package and a new DTP package due for launch this Christmas called *Tempest.*

Still with music Roland was demonstrating Pandora's Midi music package *Inspiration.* EMR demonstrated a SMPTE expansion card for its Studio 24 Plus realtime record and playback system.

Oak Computers was showing off a variety of CAD packages and *Worra Battle*, a 3D tank game developed with yet another CAD package soon to be released. Also on the Oak stand were SCSI disc upgrade kits.

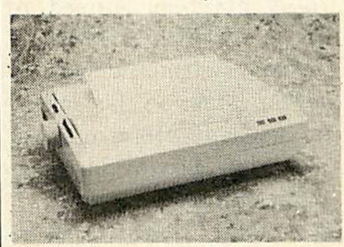
■ A number of new products are due to be launched at the forthcoming *Computer Shopper Show.*

Audio Visual Research will demonstrate Archimedes Replay, a new sound sampler for the Arc. A range of educational packages from AVP for the BBC, Master and Archimedes will also be on show.

Digita International will launch a new genlock for the BBC micro called Multigen. It is an external device which comes complete with its own power supply at around £250. Graduate Computing will launch a new educational package for the Arc. It's called *Mathematics Educational Software* and covers the new national curriculum.

# Cheap printer from Action

Wembley based Action Computers is offering the Mannesmann Tally MT81 entry -level 9-pin printer for £129 with a two-year warranty.



Three modes, draft, correspondence and NQL are available at 155cps, 130cps and 26cps respectively.

Character pitch can be set between 10 and 20cpi, and line spacing can be set at six or eight lpi, or if your like, it can be programmed in increments of 1/216in.

IBM Proprinter and Epson FX85 emulation with 240dpi graphics resolution are also featured together with push-feed tractor, auto-park and an 8K buffer. Further options include a cut sheet feeder, serial interface and desktop stand. Action can be contacted on (0800) 333 333.

# Show

The Wonderful World of Acorn is the name given to the Acorn area at the *Computer Shopper* Show 89 which is held from November 24 to 26 at Alexandra Palace, London.

Apart from Acorn itself, household names in the Acorn market which will be exhibiting include AVP, Beebug, Care Electronics, Dabs Press, Eclipse Computer Supplies, Fourth Dimension Software, Main Media, Manor Court Supplies, Minerva Software, Morley Electronics, Pres and Tynesoft.

Admission is £4 for adults and £3 for children with a discount of £1 per ticket if ordered in advance on 051-357 2961.

# Top dealers rewarded

Acorn's top three dealers were presented with *Acorn Gold Plate Awards* at the company's premier dealer league dinner.

The awards were for selling the most A3000s in a single order, for supporting the most innovative application of an Archimedes and for the best promotional effort throughout the year.

An order for 500 A3000s from Durham LEA for Newcastle based HCCS got the prize for the highest order and B&S Computing won the innovative application award for developing a program for a customer who supplies seat embroidery for Ford cars.



The award for the best promotional effort went to Chris Cane of Calancraft for his help and support at Acorn events throughout the year.

Calancraft is on (0932) 342 137, B&S is on (0602) 491202 and HCCS is on 091-487 0760.

## News in brief

■ Representatives From Cambridge based Acorn, Torch Technology and five others have formed a **UK X-Window** group.

The group known as **Control-X** has been formed to discuss the Unix based X Window system and ways to work together on this emerging standard. More information from David Slight at Acorn on (0223) 245200.

■ Meadow Computers has released a Risc OS version of *Micro Trader*. Any accounts or stock program can be run without disc swapping. Faster searches and improved analysis facilities in the accounts program plus a wider range of nominal ledger transactions are also featured. Meadow is on (0256) 892008.

■ Acorn has released Ansi C (release 3). New features include a Risc OS library, support for developing desktop applications, overlays and relocatable modules, plus a number of enhanced development tools and new libraries. Release 2 owners may upgrade for £70 plus £5.20 p&p. Acorn is on (0223) 245200.

■ The new adventure from Robico is here. *Stranded!* for the Arc costs £29.95 and takes you into the future on board a huge Starfreighter.

Call Robico on (0443) 227 354 for details.

## Diary Dates

*7–8 November.* **Working Together conference.** Part of the British Computer Society's 'Disability Programme'. Tel: Graham Watson, 01-874 0637

*20–21 November.* **West Wales Computer Business Equipment Exhibition.** Carmarthen. Tel: (0267) 89207.

*24–26 November.* **The Computer Shopper Show.** Alexandra Palace, London. Tel: Database Exhibitions (0625) 878888.

# Oxford uses Acorn equipment



Acorn Computers has supplied computer equipment for the Oxford Schools' Science and Technology Centre which is housed in Oxford University's Clarendon Laboratory.

The centre was opened in September by the University Chancellor Lord Jenkins of Hillhead. This was followed by a ceremonial dinner sponsored by Acorn which supplied equipment for the centre and assisted with the initial funding.

Besides providing teachers with IT Information and support, the centre will be the base for the European Technology Education Database which is currently being developed on two R140 Unix workstations which were also supplied by Acorn.

# Hello from Darlington

Eastbourne School in Darlington has become one of the first schools to establish a BBC A3000 based facility.

The school already uses a number of BBC B computers for a range of computer aided learning projects across the curriculum. The A3000s will be used in conjunction with traditional teaching methods, mainly within the science, art and special needs areas.

■ Eastbourne 'School falls within Durham local education authority which was the first LEA to order the A3000 when it was first launched.




## Educational innovations

The latest innovations in educational technology will be revealed in January at the biggest BETT show ever.

Acorn will have an extensive stand and many companies which support Acorn will also be there. These include AVP Computing, Cambridge Software House, Cumana, Data Design, Economatics, Hybrid Technology, Integrex, Lego, Linear Graphics, Logotron, MicroAid, Microvitec, SJ Research and Timestep Weather Systems.

The Educational Technology Awards' judging panel is currently making its final deliberations and the winners will be announced at the show.

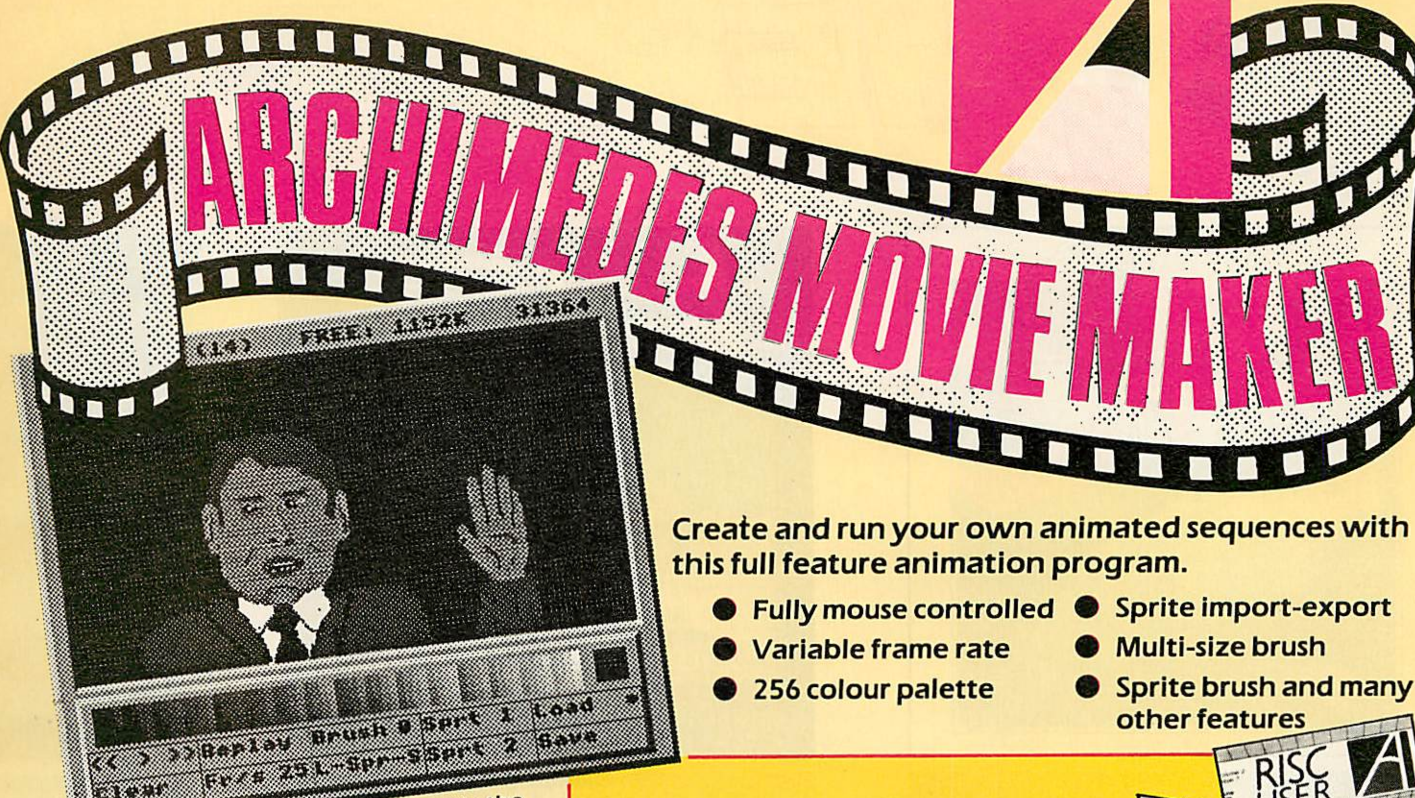
Visitors will also be able to attend a free seminar programme and come along to the *Educational Computing* stand, where they can meet the magazine's staff.

The show takes place at the Barbican, London, from 17 to 20 January 1990. You'll find a ticket enclosed in this issue of *BBC Acorn User*. If you need more for colleagues, contact Elizabeth Coles at EMAP Exhibitions on 01-404 4844

## Conversions from Sherston

Educational software house Sherston Software is releasing Archimedes and A3000 versions of its adventure games.

Famous titles for children such as *Fleet Street Phantom*, *Mapventure*, *Microbugs* and *Wizards Revenge* will soon be available in Arc format. Owners of the BBC package can switch to an Arc version with a new disc costing approximately £6. Complete Arc packages will cost the same as the BBC range. Contact Sherston for a price list and details on (0666) 840433




Create and run your own animated sequences with this full feature animation program.

- Fully mouse controlled
- Variable frame rate
- 256 colour palette
- Sprite import-export
- Multi-size brush
- Sprite brush and many other features

This program was recently featured in the pages of RISC User. It is now available on disc to members (see below).

## SPECIAL OFFER

**Subscribe NOW to RISC User and you can get the ARCHIMEDES Movie Maker disc at the members price of only £4.75 + 60p p&p. The Movie Maker disc is available to non-members at £15.00 + 60p p&p.**

## Just one of many...




This is just one of the many useful programs that subscribers have received free in RISC User magazine. Each issue is crammed full of:

- hints and tips on programming the ARC
- handy utilities
- useful applications
- smart graphical routines
- tutorial articles on getting the most out of your Archimedes
- plus reviews of all the latest for your machine




Under the Lid (a tour of the Archimedes hardware)
RISC User Desktop Diary
Mastering the WIMP
A Colour Image Processor
Machine Code Single Stepper
The ARM3 RISC Processor
Basic Squeeze
Desktop Basic Handler
The RISC User Notepad
ARC Procedure Library
Converting Text Files for 1st Word Plus
Animation Techniques
Multi-Tasking with RISC OS
Acorn's Ray Tracer

## OTHER BENEFITS

When you subscribe to RISC USER you get 10 magazines a year, dedicated solely to the Archimedes and full of new ideas, stimulating articles and programs, mailed to your home plus:

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I enclose a cheque for £______ (all cheques must be in pounds sterling, drawn on a UK bank) or.

Please debit my Access/Visa account No. ______

Expiry Date ___/___/ Signature ______

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AUd










## U.I.M.

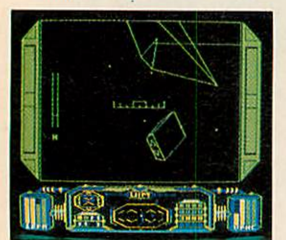
U.I.M. is a massive 3D arcade adventure set in the future. 2 1/2 years of dedicated design and programming have produced this massive game.The "greenhouse" gases melted the icecaps and all life now exists in the oceans. There are over 65000 underwater ports each with their own colonies.

You must travel the oceans, trading in commodities, shares and currency. There are over 250 missions to complete before you will find your goal - the U.I.M. - created to be almost a god! Your craft is a highly manoeuvrable (and expandable) futuristic submarine named Black Satyr.

On your travels you will encounter many submarine types. Many of the most advanced and aggressive submarines do not appear until you reach later networks of ports. In addition you will also meet the Replicants - man-made underwater machines which have gone "renegade" and are capable of reproduction.

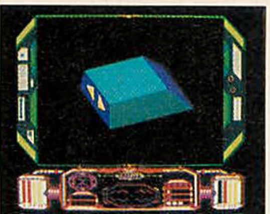
As you progress it is therefore essential to avail yourself of the highly sophisticated range of combat and defensive equipment available. The quest for the U.I.M. will be long and involved, the dangers intense, but the reward priceless!

**U.I.M. is disc only and will run on BBC B or B+ with 16K of sideways RAM, BBC Master series and all Archimedes Computers.**


BBC


BBC


ARCHIMEDES


ARCHIMEDES




## E-TYPE

**Take control of £70,000's worth of gleaming "E-Type" and head off for the drive of a lifetime. Hear the digitised roar of the 5.3 litre 12 cylinder engine as you tear along lanes, motorways and desert tracks at over 150 mph.**

"E-Type" takes racing simulations into the world of 32 - bit RISC processing and gives you smoother, faster and more detailed graphics than you are even likely to see in the arcades.

If you're new to driving you can take the easy-to-drive automatic for a spin but experienced drivers can optimise their performance in the faster 5 speed manual "E-Type". There are hazards galore including other cars, roadworks, trees, rocks, bushes, billboards oilspills, etc. etc.

"E-Type" has been produced by the highly acclaimed and experienced Gordon Key who also produced the best-seller Holed Out.

### E-Type Designer

Design your own "E-Type" tracks with this highly advanced but simple to use designer. It is enormously flexible to produce an endless variety of tracks to challenge you and your friends. (N.B. You need the original E-Type in order to use this designer).

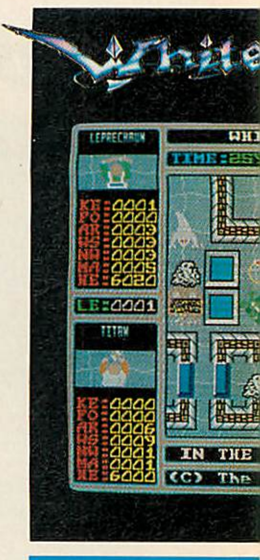

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## WHITE MAGIC

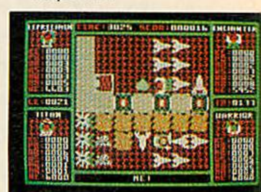
White Magic is a unique arcade adventure in which you control 4 varied adventures:-

**Kaldor the Leprechaun, Cheysul the Titan, Moriana The Warrior and Mandrake the Enchanter.**

You can transform between all 4 characters at will and use their much needed special abilities.

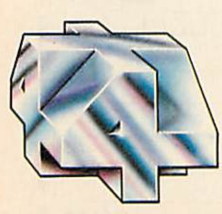
It features 32 massive action-packed levels filled with aggressive guards and trolls, haunting ghosts and spectres, curious objects to find and use, and much more .....

White Magic is not a game for the faint-hearted; it is a fast-action game which requires fierce hand - to - hand combat and frantic weapon fire.


BBC



ARCHIMEDES



The Fourth Dimension

| PRICES AND AVAILABILITY | ARCHIMEDES 31/2" DISC | BBC B/MASTER 51/4" DISC | BBC AND ELECTRON CASSETTE | MASTER COMPACT 31/2" DISC |
|---|---|---|---|---|
| U.I.M. | 29.95* | 19.95 | - | 21.95 |
| E-Type | 19.95 | - | - | - |
| E-Type Designer | 16.95 | - | - | - |
| The Olympics (6 Events) | 19.95* | - | - | - |
| White Magic | 19.95 | 12.95 | 9.95 | 13.95 |
| White Magic 2 | 19.95 | 12.95 | 9.95 | 13.95 |
| Holed Out | 19.95 | 14.95 | 12.95 | 15.95 |
| Holed Out Extra Courses 1 | 16.95 | 11.95 | 9.95 | 12.95 |
| Holed Out Extra Courses 2 | 16.95 | 11.95 | 9.95 | 12.95 |
| Holed Out Designer | 19.95 | - | - | - |
| Arcade Soccer | 19.95 | 12.95 | 9.95 | 13.95 |

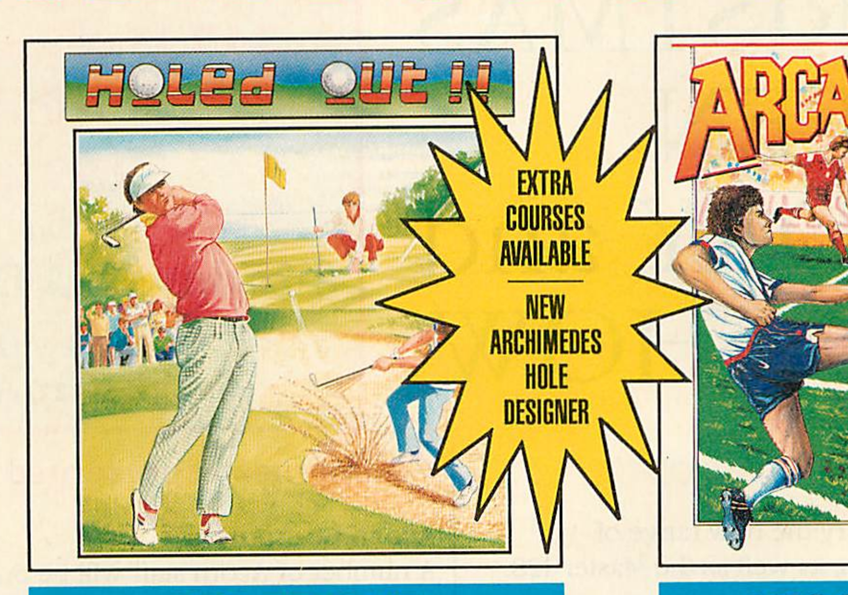
*The Olympics and U.I.M. Archimedes versions due for release 5th December, 1989.

# DIMENSION










ARCADE SOCCER

## WHITE MAGIC 2

This includes 32 brand new and highly dangerous levels plus a complete level designer.

The level designer is a doddle to use and can be used to alter or design levels from scratch.

An extra invisible feature in White Magic 2 will really confuse our adventurers!

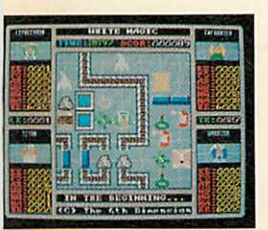
**Reviews of White Magic**

"The graphics are superb .... An absolute winner"
*Electron User Golden Game August '89.*

"Playability is good and I had to tear myself away in order to write this update review."
*Archie review - The Micro User, October 1989.*



ELECTRON



ARCHIMEDES

## HOLED OUT

The most comprehensive, realistic and highly acclaimed golf simulation on the market today. This volume contains the original 2 contrasting 18 hole courses and comes complete with an easy to follow 16 page manual.

"I play golf and this game is the closest thing I've seen to the real game on a computer". *Archive, June 1989*

"I wouldn't have thought it possible to get a better simulation out of the beeb". *BBC Acorn User, June 1989*

"The 3D perspective graphics are stunning". *Electron User GOLDEN GAME June 1989*

"Holed Out is great ..... The game plays very well and the graphics are superb". *Popular Computing Weekly. March 1989*

"The Electron version is brilliant - it's almost the same as playing at Gleneagles. Unreservedly recommended". *A & B Computing Game of the Month, June 1989*

### HOLED OUT EXTRA COURSES

In response to your many requests we have now produced 2 volumes of extra courses. Each volume contains 2 superbly designed brand new courses plus the original Holed Out program; therefore you do not need the original Holed Out to play them. Each course has been meticulously created to test your golfing abilities to the limits. The holes are very varied and even Nick Faldo would need to use his skills to keep up his recent record.

### ARCHIMEDES HOLE DESIGNER

Create your own golf courses with this easy - to - use yet highly sophisticated hole designer. Its flexibility allows you to define all aspects of the holes from their pars to the position and size of the lakes. It will keep you enthralled for years.



BBC



ELECTRON



ARCHIMEDES



ARCHIMEDES

## ARCADE SOCCER

**Arcade Soccer really is football action at its very best.**

Using an overhead view to make game play as exciting as possible it features everything that you could want in a football game. Corners, sliding tackles, throw-ins, goal kicks, dribbling, shooting, passing and much more. But not only does Arcade Soccer give you Total Action it also puts you in Total Control.

Firstly you can play with either keyboard or joysticks, against the computer and/or with up to 23 friends. The options are almost limitless; you can choose the skill of the goalkeepers, the speed and length of the game, play "friendlies" or tournaments and even enter the most coveted of championships - the World Cup.

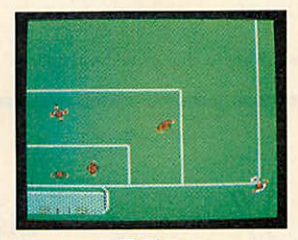
"The game is very playable and you do get a feeling of involvement as you knock the ball into the corner of the net straight past the diving goalie. It's definitely one to play again, and if you've enough friends it could make for a good day of enjoyment - and not a lot of games can do that. Value for money ... 10 out of 10". *The Micro User, October '89.*




BBC



BBC



BBC



BBC

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Most of out games are available from most good dealers.

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The Fourth Dimension




Every one is welcome, in our new offices at:

**117 Hatfield Road**
**St Albans**
**Herts.**

On

**Sunday 3rd December**
**10 am - 4 pm**

**Tel: (0727) 40303**

## Events include:

A hands-on chance to try the new range of Archimedes Computers, as well as the Master 128.

Demonstrations of the latest software and hardware for the Archimedes and the BBC B / Master series.

Instant 0% finance arranged on the spot for all Archimedes and Master 128 computers. Take your computer away with you.

An opportuntity to meet the BEEBUG and RISC User editorial team and contributors.

The New Beebug Desk Top Publishing system unveiled.

Special reductions and clearance offers on a wide range of items. Ideal for last minute Christmas presents.

The BEEBUG technical team to answer your technical questions.

Refreshments will be available.

The entire BEEBUG premises will be open enabling us to offer you an interesting and relaxed day in pleasant surroundings.

Events & visiting companies subject to change without notice.

## Companies represented include:

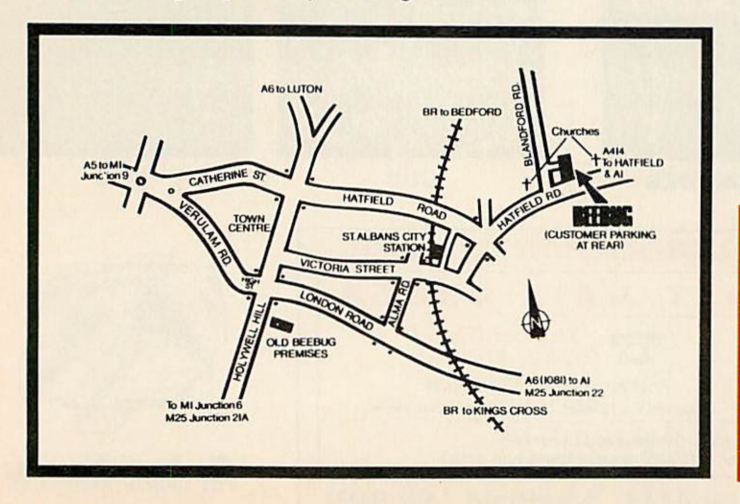
**Acorn Computers**
A number of Acorn staff will be on hand to demonstrate and discuss the complete range of computers including the A3000.

**Colton Software**
Pipedream 3, one of the most powerful packages available for the Archimedes will be on demonstration along with View Professional for the BBC B and Master 128.

**Computer Concepts**
The new 'Impression' package will be in action along with the Scan-Light and Scan-Light Junior scanners.

**Minerva**
Minerva will be demonstrating their extensive range of quality software for the Archimedes including their new 'MultiStore' database.

**Computerware**
Discuss your hard disc requirements with the experts. Drives ranging from 20 Mb to a massive 75 Mb are available for both the 300 and 400 series.




## HOW TO FIND BEEBUG

**By Car** - St Albans is easily reached from A1 A5 A6 M1 and M25.

**By Train** - We are 10 minutes walk from St Albans City Station on the King's Cross to Bedford line.

PRESENT THIS VOUCHER ON THE OPEN DAY WHEN BUYING GOODS OVER £200 AND WE WILL GIVE YOU A FREE £10 GIFT VOUCHER.
(ONE PER PERSON)

**£10 GIFT VOUCHER**

# Still hacking away

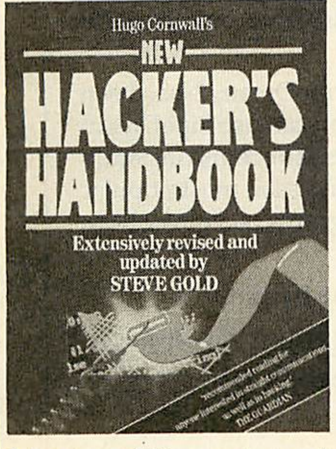
In 1985, Hugo Cornwall's *The Hacker's Handbook* caused a major storm. The book listed passwords to commercial systems and in general was a major tool for anyone interested in hacking in general.

Hugo Cornwall's *New Hacker's Handbook* (by Steve Gold) is now available at £10. Gold shared responsibility for the much publicised great Prestel hack.

He is also known on Micronet as Micro Mouse where he edits a daily comms column.

The blurb informs us that the new edition covers viruses, recent hacking cases, new services and such like.

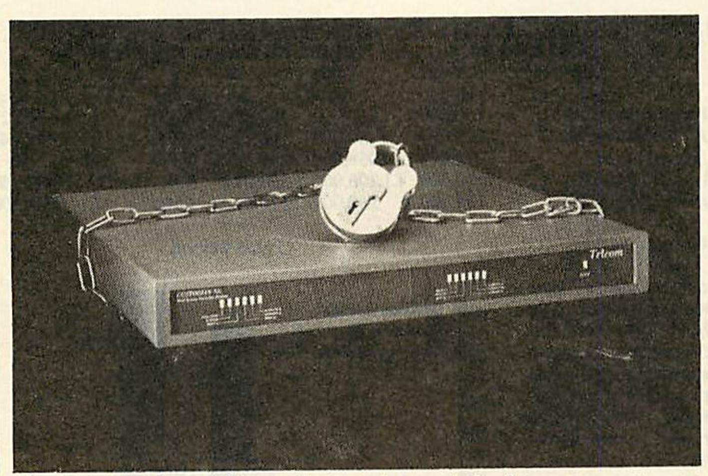
In reality the book contains very little new information.




It's a new edition, and as such contains a lot of the original material – a lot of which is out of date. Gold says he took on the job of updating the book as Cornwall was busy.

Alas, Gold's contributions read as if he was doing other things as well.

The book is by no means a hacker's handbook. Don't buy it for phone numbers and passwords – there are none. However, if you're new to comms and are looking for an introduction to datacomms and what hackers get up to then the title fits the bill.



**Beware hackers! Your electronic exploits have come to an end, thanks to our friends at Tricom. The company has finally realised that any security system can be hacked itself. So, the Custodian XL dial access security system is supplied as standard with a good old fashioned quality lock. A ball and chain is supplied with portable models.**

## GO FOR MLINK

Well they've done it. Microlink has now moved from Telecom Gold to Istel Inet.

Access to Microlink will be through the Infotrac network (at no charge) which covers about 90 per cent of the UK at local call rates. Connect charges are 5p per min peak with free off-peak access. However, there is a data transfer charge of 4p per block during peak hours and 1p per block after that. A block consists of 500 characters and the first block is free.

A full review of the new look Microlink will appear in a future issue. For more info call Microlink on (0625) 878888.

## MAILBOX UPDATED

Prestel, the viewdata-based system run by Dialcom now has a new mailbox system in operation.

The first thing I noticed about the new system is that it not only informs you that messages are waiting for you when you log on but how many are waiting.

Keying 0 at this stage will take you to the message summary menu which lists details of any messages that have not been deleted. This includes mail that is both new and not yet deleted.




Mail can be stored in a notepad, edited, forwarded and replied to.

Does it improve Prestel? Yes and no. Subscribers have the option of using the old mailbox system. No doubt Prestel hopes to attract new customers but Telecom Gold has the largest subscriber base and is better suited for electronic mail.

■ A number of readers appear to be having problems with text and file transfer on Telecom Gold. Here are a couple of tips.

When using Zmodem call Gold in its all-purpose 8-bit port on 01-203 3033. Always ensure your local flow control is Xon/Off and if you have the option turn off remote flow control.

File transfer on Gold has three file types – text, Ascii and binary. If you are transferring wordprocessor files select Ascii. Plain text and anything else is binary.

Should you have an error correcting type of modem such as a Hi-Tec EC2400 follow the above but take note: For text and Ascii file transfer use Gold's Xmit facility rather than Xmodem. Together your modem and Gold will do the error checking transparently.

For binary files turn off data compression and fall back to MNP level four and use Xmodem. All clear?

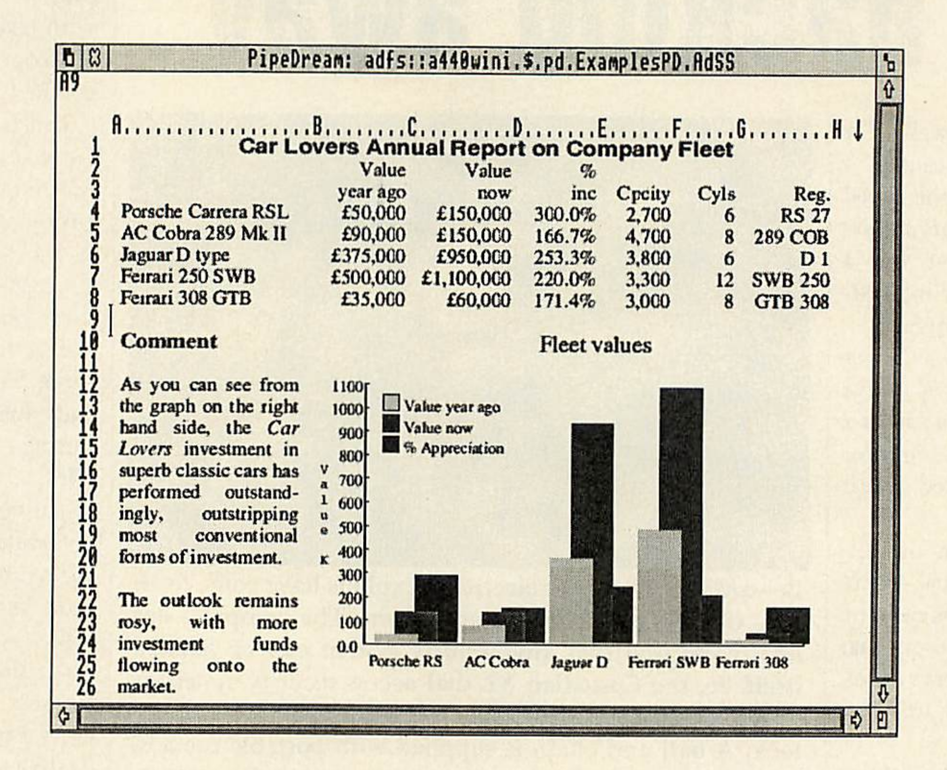
■ The Channel-X network of bulletin boards which specialises in Acorn music has been shaken up by the departure of its main board.

CCL4 and its Sysop James Lawson are to go it alone. James introduced a lot of new features on November 5th so check the board out on (0482) 665798 (data).

■ Commercial service The Direct Connection has opened several new gateways. Subscribers now have electronic mail access to a claimed four million users on 12,000 systems worldwide.

Messages can be sent and received from systems including Compuserve, MCI Mail, Dialcom (including Telecom Gold), Janet, Bitnet, CSNET, NSFNET, USENET and Arpanet. Call the Direct Connection on 01–853 3965 (data) for more info.

# PIPEDREAM 3




PipeDream 3 breaks down the barriers between word processor, spreadsheet and database. You can include numerical tables in your letters and reports, add paragraphs to your spreadsheets, and perform calculations within your databases.

Based on PipeDream 2, the best-selling integrated package for the Archimedes, PipeDream 3 has been completely re-written to take full advantage of RISC OS - if you can use RISC OS, you can use PipeDream 3. It is fully multi-tasking and multi-windowing, so you can work on many documents at once and instantly move information between them. And since PipeDream 3 can automatically load and save most popular file formats, including VIEW and First Word Plus, switching to it from other programs has never been easier.

**Power, flexibility, speed, ease of use. PipeDream 3. Breaking down the barriers.**

For a free brochure, see your Archimedes dealer, or phone us on 0954 211472 or return the coupon.

PipeDream 3 is for all Archimedes computers with RISC OS and 1Mbyte of RAM.

PipeDream 3 costs £147.00 +VAT.

**Major features include:**

- many documents loaded at once
- intuitive RISC OS user interface
- displaying and printing of pictures within text
- built-in 93,003 word spelling checker
- file compatibility with PC & Z88 PipeDream and BBC View Professional
- background recalculation
- keystroke compatibility with Z88 & PC PipeDream
- Z88 filing system
- automatic loading of VIEW, ViewSheet, Lotus, First Word Plus, Tab and CSV files
- automatic saving of VIEW, Lotus, Acorn DTP format, Tab and CSV files
- multi-field sorting
- use of all available fonts
- 62 spreadsheet functions
- external references for 3-D modelling
- macro file recorder
- slot protection

For a free brochure, complete and return this coupon
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Colton Software, Broadway House, 149-151 St. Neots Road, Hardwick, Cambridge CB3 7QJ, England.
Fax: 0954 211607 Tel: 0954 211472

AU/12/89

*All trademarks acknowledged. The chart in the screen shown above was produced by sending numbers from PipeDream 3 to Lingenuity's Presenter 2 and then loading the resulting graph back into PipeDream 3.*

**Colton Software, Broadway House, 149-151 St. Neots Road, Hardwick, Cambridge, CB3 7QJ, England.**

**Fax. 0954 211607 Tel. 0954 211472**

# Fair dinkum Sherston

In a bid to beat the postage increases, the frugal Bill Bonham of Sherston Software has inundated journalists with press releases recently.

Rumours of a consequent paper shortage in Wiltshire have been denied by both Bonham and the Forestry Commission.

However, Sherston does seem to have something to say. Not only is the company supporting the A3000 with versions of eight programs including *Mapventure*, *Microbugs* and *The Wizards* under emulation but it is also opening a shop in Australia.

This will be good news for the antipodes as communication difficulties between here and there cause problems for software companies.

Sherston (Australia) will be run by Roger Thompson from Perth who will be offering schools there a 10 per cent discount on all titles until the end of the year.

And there's more. Sherston has also released network versions of the popular *Microbugs* and *Mapventure* packages to add to the other six educational adventures plus the ever popular *Typesetter!* which was networked a while back.

All now run on Econet (Acorn and SJ systems) and the prices for the two new versions are £45.60 and £55 respectively.

And yet more. Sherston has also released *Teletype* which builds on the idea of the newsroom simulation and gives various stimulus files to get ideas moving.

Moreover, a series of Concept Keyboard programs entitled *Concept Kate's Keyboard*, *Concept Ken's Cartoon* and *Concept Kim's Challenge* have just been released for the primary age range.



**Newman College Computer Centre (famous for its Grass) has difficulty with its latest control technology project. The out of control robot device with on-board Australian (digger?) software was last seen heading down the M5 with Roger Keeling in hot pursuit. Ground staff were unavailable for comment.**

## NOT RIGHT

It has been brought to my attention that my article in the October issue relating to the original MESU music project was inaccurate. I am told I have misinterpreted the facts relating to the 'substantial sums poured into' the music project and that those sums include a large quantity of INSET and curriculum development at Warwick and Reading Universities.

Secondly, I have been informed, and I accept, that the *Touching Sound* program is 100 per cent original work written by MESU programmers.

My article may have been construed as implying that the program had been copied in substantial sections from software originally written by Hybrid Technology. MESU maintains this is not true, and I accept this without reservation.

## NEW SURVEY

In a survey published in April 1988, the Northwest Semerc listed the top 30 programs available for children with moderate learning difficulties and which were useful in the field generally.

Martin Littler is repeating the exercise this year and will publish two booklets relating to moderate learning difficulty children and to those with either physical or sensory handicaps.

New competitors for the list include five 'scenarios' published by the Semerc itself. *Our School*, *Elmtree Farm*, *Toy Cupboard*, *Moving In 2*, and *Fantasy That*.

All these feature greatly improved graphics on earlier versions. Details from Martin Littler at Fitton Hill Curriculum Centre, Rosary Road, Oldham OL8 2QE.

## SQUARE PEG

More news of the vast expanse of technical knowledge at the chalk face.

One major software company which distributes many of its products as Roms reports one school returned a faulty chip with the message: 'Am returning this piece of software since it will not fit in the disc drive'!

■ Dr Margaret Shotton of Nottingham University has recently published the results of her survey into computer addiction.

From interviews, tests and questionnaires she has compiled a study of why computer-dependent people find more satisfaction from dealing with machines rather than with other humans.

The somewhat controversial results are published by Taylor and Francis at £12.95 on (0256) 840366.

■ BBC Soft has released two software packages to accompany its *Look and Read* series entitled *Through the Dragon's Eye*.

*The Storyboard* allows children to take images of the characters and backgrounds associated with the story and build their own versions on screen which may then be sent to a printer.

The second pack is an adventure by Peter Smith in which the children go on a quest to save the magical world of Pelamar.

■ Two recent conferences for users of networks in education (Educational Networks 89 and Econet 89) were filled to capacity and well received by delegates from all over the country.

Educational Networks was run by LTS and Resource and looked at the educational implications of networking generally. The conference was supported by NCET with seminars and workshops on the provision of IT in the curriculum.

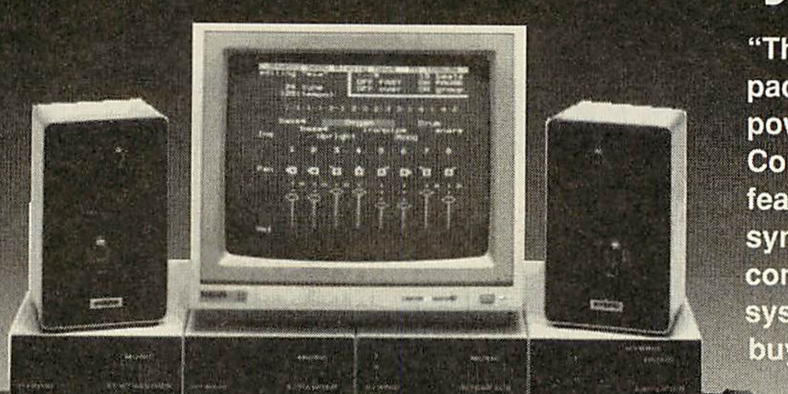
Econet 89, held a week earlier, was an Acorn affair designed to appeal to the more technical user.

Workshops on all aspects of technical support and new techniques were complemented with sessions on specific applications. It is intended that both events should run again next year.

# The Hybrid Music System

"There is no comparable integrated music system for any micro."
The Guardian

"There is nothing to compare the system with. It has got to be one of the best and cheapest ways into computer music"
Micro User



"There is not another package which has this power and versatility. Compare the price and features with synthesisers and other computer-based systems – then go and buy one."
Micronet




The 5000 is a complete package for your BBC Micro, giving you the power to carry any piece of music from entry and arrangement to final performance with high-quality instruments and studio effects. Comprehensive software lets you enter music in conventional notation or easy shorthand, arrange phrases and parts in any combination, design instrument sounds and adjust instrumentation, volume, balance, and tempo while the music plays.

The software includes the AMPLE language, offering you unlimited scope for control of music and sound material, and opening the door to a wide community of users and experts exchanging music and advice through user groups, magazines and bulletin boards.

The 5000 package includes a 16-channel stereo synthesiser, software on ROM and disc (including many example pieces) and a 162-page illustrated User Guide, requiring only a 5-pin DIN lead to connect to your existing hi-fi. *£140*

**ALSO AVAILABLE**

AMPLE Nucleus Programmer Guide, music albums (15 titles), speakers, headphones, accessories.




Together with the 5000, the 4000 gives you a complete desktop music studio. Perform with any of the 100 supplied sounds or design your own, record with multi-tracking, edit and print-out in musical notation, and much more. *£146.96*




**NEW!**

The 3000 provides another 16 sound channels, expanding your system to a colossal 32. Use more instrument layers, more musical parts, more voices per part, more echo/reverb effects and more outputs – stereo or quad. *£100*




The 2000 links-in any synthesisers and drum machines equipped with MIDI, automatically slaving their sounds to your music. You may also write programs with 'common MIDI' or any manufacturers' own dialect. *£140*




An alternative to your hi-fi, the 1000 turns your system into a self-contained workstation, ideal for the study or classroom. Use it with speakers and up to three headphones, mixing-in the computer's own sound. *£140*

Compatible with BBC Models B, B+, B+128K and Master 128, with 40/80-track disc drive. All prices exclude VAT.

**NEW SOFTWARE RELEASES**

**AMPLE Toolbox** – professional text editor, graphics image designer, program compiler, sideways RAM module store and more. *£34*

**Music albums** – 'Shivering Again' by Michael Harbour, 'Electricity' by Russell Fray. *£4.30 each*

**HYBRID**

Hybrid Technology Ltd, 273, The Science Park, Cambridge CB4 4WE
Tel. (0223) 420360

**Please send me:**

- full details and a FREE 20-minute audio demonstration cassette. ☐
- Music 5000 Synthesiser package, UK cheque for £161 inc VAT enclosed (please allow 28 days for despatch). ☐

Name ____________________

Address ____________________

J72

____________________ Post code __________

# Merry melodies

Christmas is traditionally a time for listening to and playing music and computer music albums on floppy disc are increasingly becoming part of the festive scene. Owners of the Island Logic Music System and the Archimedes computer already have a range of albums to choose from.

Have you thought about producing your own album? Play record producer over the festive season!

The album could be your own material but remember if you want to include your version of, say, a current chart hit, you may need the copyright holder's permission.

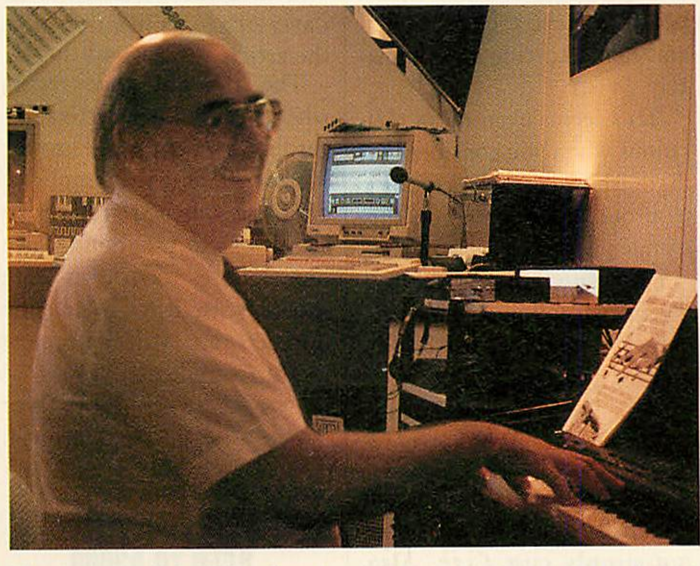
If you intend to sell the album, you should cater for the minimum system requirements. A common practice is to save a 40-track version on side 0 and an 80-track version on side 2.

Include sleeve notes. People like to know what the music is about – in case it isn't clear! - how it was written and so on. Include an 'info' word in Ample pieces and put a readme Ascii file on discs with other music programs.

The date and version number and a copyright message should also go here. A useful ploy is to put a short message on the disc with *TITLE. Compact the disc before copying.

Don't forget to include your name and a contact address so that you can receive fan mail. If you have written more than one album, publicise it in the message.

Then there's the album 'cover'. Although this may not be essential it can contribute to the overall presentation. Use any graphics mode and *LOAD the screen when the disc is booted. After a few seconds delay (or upon the press of a key) this could lead to information about the album.



**The irrepressible Mike Beecher on Acorn's stand at the *British Music Fair* in July. Mike was demonstrating EMR's new MicroStudio (£49.95) for the Archimedes which converts real-time input into traditional music notation.**

Most commercial music programs cannot display a screen while playing the music but Ample pieces are often accompanied by a display of mode 7 graphics.

The program in this month's yellow pages shows how you can incorporate simple graphics into a menu using MENUDISP and DISPLAY.

Finally, think about the order in which the pieces will play. Most Hybrid albums let the user select a tune from a menu list. Vinyl albums play completely through one side – or from the point at which you drop the needle. To simulate this you could arrange for each tune to chain the next one (see April's *BBC Acorn User* for details of one way to accomplish this).

Other music programs, however, are unlikely to have such a chain feature, although you can use the Linker module in the Island Logic Music System to produce a similar effect to chaining.

The Ample music in this month's yellow pages has a typical Christmas flavour. If you run it from the Mixing Desk you'll notice the faders moving during the fadeouts. The fades are produced with VOL using fade1 and fade2. fade2 uses allvol to select those parts which will fade. This could be used to fade every part but in this case it leaves the wind sound on parts4. Note part5 which acts as a timekeeper before the final fade.

The backing was constructed from individual chord words such as Dmbar and DCbar. This makes it easy to arrange and alter the accompaniment. Note the use of broken chords in these words to thicken the sound and also the use of echo – if you have eight voices, use them! Listen in stereo, too, if you can.

Finally look at RUN which shows how MENUDISP and DISPLAY can be used in single word to mix graphics with menu options – could be useful in your album!

**Ian Waugh**

■ EMR has put together a demonstration disc called *Symphony* (£9.95) for the Archimedes. It plays a variety of music using sampled sounds and it will play back via MIDI. The files can be loaded into EMR's Studio 24 Plus. EMR can be contacted on (0702) 335747.

■ From JB Software comes *The Reinhardt Collection* and the *Jazz Disc* Vol 1 (soon to be followed by Vol 2) by Amplinex member John Bartlett.

John makes excellent use of Ample's unique music programming features to create extremely expressive and 'near-human' music interpretations. Discs are £3.50 each from JB Software, 20 Crawley Avenue, Wellingborough, Northants NN8 3YH.

■ Hybrid Technology has added five new albums to its list. *Plaice* and *Anchovy* are both by The Fish Shop Boys and contain music very much in a percussive vein.

*Zen & The Art of Making Music* is another disc for Obernell fans. *Shivering Again* by Michael Harbour and *Electricity* by Russel Fray aged 15 and 14 respectively prove there's a wealth of young musical talent out there. All are £4.95 each from Hybrid on (0223) 420360.

■ A free Archimedes music program is on offer from Stellar Enterprise in return for an 800K formatted 3.5in disc, first class stamp and self-addressed envelope.

The disc contains over two hours of music and a 70 page User Guide. Stellar Enterprise hopes satisfied customers will donate from £5-30 to any registered charity (although one satisfied customer managed £170).

Stellar Enterprise is at 84 Dudsbury Road, Ferndown, Wimbourne, Dorset BH22 8RG. Tel (0202) 575234.

# LETTERS

BBC Acorn User, 20-26 Brunswick Place, London N1 6DJ. BTG/TTNS 81:RED001

## BACK TO SCHOOL FOR TEACHERS

In response to the article by Chris Drage and Nick Evans titled 'Report Retort' (*BAU*, October '89) about the Design and Technology National Curriculum proposals, I would like to draw your readers' attention to work being done by the Department of Design and Technology at Loughborough University.

A new project has started to research and develop the In-Service Training requirements of teachers who will be involved with both the management and delivery of Design and Technology across the National Curriculum.

The courses, which should commence in Spring 1990, will be aimed at teachers from disciplines directly linked to Design and Technology as well as those involved in Curriculum Management in schools. They may lead to a Diploma of Design and Technology Education.

Details from the Department of Design and Technology, Loughborough University, Leics LE11 3TU.

**N Zanker**
(Design and Technology INSET Co-ordinator)

## INFLATING UPGRADES

I would like to bring to the attention of your readers a company in the south-east of England which is offering an Arm3 upgrade for the Archimedes 300 and 400 range of computers.

The cost of the Arm3 upgrade as published is £595, sounds reasonable doesn't it when you consider the price of an A440. But should we really pay £600 for a small circuit board, an extra clock crystal and a chip costing approximately £150?

This seems even more ridiculous when you consider that there isn't even a socket for a co-processor provided on this wonder board.

I have no desire to rubbish the British computer industry, but why should we pay highly inflated prices?

**Gordon Turner**
Port Glasgow

**As yet the Arm 3 chip is not generally available so it does not simply cost £150. Also, there is more to selling a product than simply putting components on a board. Aleph One has been 18 years in the business and means to stay around for a long time yet with good service and backup.**

## CHECKING OUT WORDWISE

Following on my compliments and suggestions regarding Chris Robbins' *Wordwise Plus* segprog 'Check it Out' published in the July issue, I would like to compliment you on publishing Nick Munns' segprog 'Good Wording' in the August issue. Both have been added to my auto-boot set up for *Wordwise Plus*, along with all of my function key definitions.

With regard to 'Good Wording', might I suggest the additional three lines:

```
*FX202,48
*FX138,0,27
*FX138,0,27
```

between the lines LOAD TEXT F$ and END. The first will ensure lower case for normal typing, rather than having to remember CAPS LOCK, and the others will save the necessity of ESCAPE, ESCAPE, as mentioned in the article, to start editing.

The thought that recurs whenever writing letters regarding segment programs for *Wordwise Plus* is the simplicity of Basic when referring to alterations to programs. Once one ignores GOTO, as one should with BBC Basic, line numbers are still extremely useful references.

**D P Dyer**
Cornwall

## BEEB TO A3000 COMPATIBILITY

I want to upgrade my Beeb to an A3000 and I have a few questions on compatibility.

For wordprocessing I use *Interword* along with *Spellmaster* and have many documents and letters on 5.25in disc. I have access to a Master 128 with ADFS and a 3.5in drive, so is it possible to just transfer the files onto 3.5in ADFS discs and then use them on the Arc version of *Interword*? Or is there a Risc OS wordprocessor that will read *Interword* files instead? Finally, can Basic programs be transferred to a 3.5in ADFS disc and then loaded directly into Basic5?

**J P Nicholls**
London

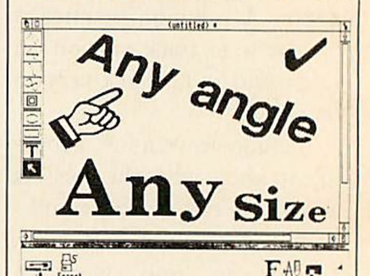
**Yes, the version of *Interword* is file compatible with the 8-bit version – so once you've got your old files onto a 3.5in ADFS disc, you can load it direct into the Arc *Interword*. Basic programs can also be loaded into the Arc. They'll run much faster under Basic 5 too. If you use the 6502 Basic Assembler, though, you'll need to use the Arc's beeb emulator.**

## BACK TO THE DRAWING BOARD

In relation to two items in the November *BAU*, you may be interested in the following.

The newly released Risc OS font editor makes it possible to access individual font characters and manipulate them to produce a huge range of interesting effects.

To do this, first load the Risc OS font editor (available on SID). Next, start up the *!Draw* application from Application disc 1. Now open the !Font directory (hold down SHIFT while double clicking the !Font icon) and then open the subdirectory of the font you wish to use. Drag the font Outline file to the font editor and a window will




open showing all of the characters available. Now select the required character by placing the pointer over the box, click and hold down SELECT and drag the character to the *!Draw* window.

The character is now treated by *!Draw* as an object and can be manipulated like other objects. However, if you are going to use the 'Snap to grid' option in *!Draw*, make sure you have the grid turned on before loading any characters from the font editor. If this isn't done, characters 'break-up' and become unreadable.

All sorts of effects can be produced for all sorts of things – posters, invites, business cards etc.

**Peter Milford**
Gosport

# QUESTIONS AND ANSWERS

If you have a problem with an Acorn micro, commercial software or a program you are trying to write then *BBC Acorn User* can help. The Post A Problem service guarantees to give you a personal answer within 10 working days for just £4.

Write out your problem with as much detail as possible and, if a program is involved, include a disc or cassette. Fill in the coupon at the bottom of this page and send it and your problem along with a cheque or postal order for £4 (including VAT) made out to Redwood Publishing. If you want recorded delivery add on the cost of this.

Please note that debugging readers' own programs or those from other magazines is a complex task and we cannot guarantee to give a full solution. Unless the problem can be spotted quickly, the Post A Problem service will only be able to make general comments. The service will answer the problem and return all material received within 10 working days of receipt. If we fail to match this promise then your cheque or postal order will be returned – you can't lose!

BBC ACORN USER READER SERVICE
20-26 Brunswick Place, London N1 6DJ.

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DAYTIME PHONE NUMBER ______________________

I enclose a cheque/postal order for £4 made out to Redwood Publishing and an sae with my problem.

OFFICE USE ONLY Date in:
Date out:
Answered by:

**Q** I have an Archimedes 310 and a BBC micro fitted with the *Wordwise Plus* wordprocessing package. I want to load text created on the BBC in *Wordwise* form into the Archimedes so that scripts can be worked on further and modified. Can you tell me the simplest way to do this?

**A** **Beebug sells a BBC/Archimedes serial kit which will enable files to be transferred in either direction between the BBC micro and the Arc. The kit uses a 3m lead which connects between the serial ports of both micros. It costs £17.25.**

**Computer Concepts has developed a special version of *Wordwise Plus* for the Archimedes which is cheap for existing users of the BBC version. It runs under the 6502 Emulator supplied on the Arc's Welcome disc. Using this Arc version of *Wordwise* should enable you to work easily on both machines although you will not really be harnessing the power of the Arc for wordprocessing.**

**Q** I have an Archimedes 310 and I want to use my machine with a MIDI expansion card, Armadillo's stereo sound sampler and the Computer Concepts' Rom podule. How can I have three podules connected at once?

**A** **A backplane must be fitted to any Archimedes 310 machine before any kind of podule can be installed. The usual two-way backplane supplied by Acorn can become inadequate if you want to use a number of podules in your machine. Several manufacturers supply a four-slot backplane which will suit your needs and most advertise in *BAU*.**

**Q** I have a BBC model B and wish to purchase good but simple to use wordprocessing software to work with the Nigerian language using the extended Roman script. For my work I need to print in a great variety of different sized fonts using a dot-matrix printer.

**A** **I recommend you purchase a copy of *Wordwise Plus* from Computer Concepts. You will then need to use it with *The Publisher* published by PMS. This package will enable you to design or adapt one of its existing range of foreign language fonts to the extended Roman script. *The Publisher* can print in a vast number of different font sizes and it is usable with any Epson compatible printer.**

**Q** My secondary school has just decided to standardise on the use of ITV's *Key* data handling package with the BBC micros we use. What can be done to transfer all our *Quest* datafiles so they can be used with *Key*?

**A** **The *Key Utilities Disc* available from the ITV Association has a series of programs that can be used to transfer *Quest, Quest-D*, Ascii and FIF format files into *Key*. It costs only £2.75.**

**Q** I use *First Word Plus* on my Archimedes A3000 with a Citizen 120D. I don't seem to be able to get the best output from the printer. I have been told I need to buy a suitable printer driver but my local dealer has been unable to get me a specific Citizen driver.

**A** **Norwich Computer Services supplies a 'shareware' disc full of differ-**

**ent printer drivers for use with *First Word Plus*. This is *Shareware Disc No 6* and will cost you about £3.**

Q We have been successfully using Oak Computer's *Parametric Design Tool* for some time. Is there any way of transferring drawings between PDT and DXT, HPGL and IGES formats?

**A Oak has recently released *The Translater* which will assist you in the transfer of drawings and plotter files in these formats.**

Q Can 24-pin printers like the Epson LQ-800 accept a screen dump intended for a normal FX compatible 9-pin printer, using, say, Watford Electronics' *Dumpout 3*?

**A The LQ800 uses the same codes to control its graphics printing but their meanings are slightly different. This is particularly true when it comes to controlling pitch. *BBC Acorn User* published two suitable Epson 24-pin screen dumps in the April 1988 issue.**

**You also may find 4Mation Educational Software's *Snatch* package useful as this has a 24-pin dump included.**

Q At what speed does the Archimedes PC Emulator run software?

**A The Arc running under the PC Emulator will emulate an IBM XT machine with a processor speed of 4.77MHz. The resolution of the emulator is CGA and not EGA or VGA.**

Q I have a BBC model B. Unfortunately one of the sideways Roms in my machine seems to interfere with some of my games. Is there any way that I can 'unplug' the Rom by using a software command? I don't want the hassle of removing it physically.

**A You can switch off Roms in a BBC model B with the command ?(&2A1+X)=0 where X is replaced by the Rom position number of the Rom you want to 'remove'.**

Q I want to 'freeze' some screens from a program and then save the screens for use in another program. Can you recommend any software to do the freezing and saving?

**A There are a number of programs that you could use for this job. Many of the printer Roms like *Dumpout 3* and *BAU's* own *UserDump* offer this facility but you will probably find *Screen Thief*, a Blue File program distributed by the northwest Semerc in Oldham for the NCET suitable. It costs the amazing sum of £1.75!**

Q Do you know if a bar code reader is available for the BBC micro? I want to use one for developing understanding of bar codes in school.

**A An educational bar code system is available from PMF Datapoint, Noak Hill Road, Noak Hill, Romford, Essex RM3 7LL.**

Q I have a Master 512 with a 30Mb hard disc attached. Is it possible to divide the hard disc into two different formats for Acorn ADFS and Dos Plus?

**A Look carefully at the programs on the Dos Plus System disc and you will find a utility that will split your hard drive into two formats in the way you want.**

## ACORN CUSTOMER HOTLINE

A number of users are confused about SID. The main questions asked are: Who is allowed to access the system and what facilities are there?

SID combines the advantages of a dedicated library and nationwide yellow pages without the disadvantages.

It's also a bit like the *BAU* Show without the crowds – a permanent forum for the exchange of information.

Its major impetus comes, of course, from Acorn itself. A large proportion of the material comes from within the company. But SID is a sociable system – always alert and sensitive to your signals.

SID can be shaped to suit your needs – you too can become a SID author! This is your chance to educate, influence and inspire, to read and be read.

SID provides the following features:

- All the information you need about Acorn products.
- Application notes on many different topics.
- Telesoftware library including software supplied by *BBC Acorn User* plus Acorn applications such as those described in the October issue of *BBC Acorn User*.
- Close User Groups such as *Archive* (Magazine), The Acorn Schools Service and Dealer/ASC section.
- A section called 'El Sid' which has areas like Language Forum, Risc OS Forum, book and software reviews, education column, graphics column and more.
- Technical mailboxes to send questions to Acorn about Acorn products.
- Bulletin boards to glean information from other users.

Acorn staff also put up answers to questions asked in these areas if they are able to be of assistance.

There are three methods of access. The first is via PSTN (Public Switched Telephone Network). This is a direct line in to SID. The second method is Fastrak which is a wide area communications network managed by The Midland Bank Group. The third way in is via a Prestel gateway.

The cost of access by PSTN is purely the British Telecom phone charges for calling the Cambridge number. On Fastrak the costs are 8p (+VAT) per minute with a minimum of £10 per quarter plus the cost of a local call.

The costs for using the SID Prestel gateway depend on the time of day. These rates combine both the SID gateway charge and normal Prestel connect charge.

For Micronet members, the cost is:

| | |
|---|---|
| 8am–6pm | 8p/min |
| 6pm–midnight | 2p/min |
| midnight–8am | 1p/min |

For other Prestel customers:

| | |
|---|---|
| 8am–6pm | 11p/min |
| 6pm–midnight | 4p/min |
| midnight–8am | 4p/min |

On Sundays from 8am–noon, the charge is at the 6pm–midnight rate.

For Micronet and Prestel there are also standard membership charges plus the cost of a local call.

Once on-line, if you are new to viewdata systems you may have trouble finding your way around.

If this happens, type *SIDMAP# and you will be able to download a map to help you find your way around the system. Plus there is on-screen help in case you get stuck in either the mail system area or the bulletin board area.

For further information please contact The SID Editor, Acorn Computers, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN.




## Archimedes

| TITLE | RRP | SALE |
|---|---|---|
| 3D POOL . . *NEW!* | £19.95 | £17.95 |
| 1st Word Plus | £91.94 | £84.95 |
| Acheton | £19.95 | £17.95 |
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| All in Boxing | £14.95 | £11.95 |
| Alpha Base | £49.95 | £44.95 |
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| Ansi C (Release 3) | £171.35 | £149.95 |
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| ARC – PCB | £195.00 | £175.95 |
| Arcade 3 Compilation | £14.95 | £11.95 |
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| Arcendium | £14.95 | £11.95 |
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| Arch. Reference Manual | £29.95 | – |
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| Arch. Basic Compiler | £99.95 | £69.95 |
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| ARTISAN 2 . . *NEW!* | £59.95 | £54.95 |
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| Disc Tree | £49.95 | £44.95 |
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| Euclid (RISC-OS) | £70.00 | £64.95 |
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| Risc Forth | £99.95 | £89.95 |
| Risc-OS Prog Ref Manual | £79.00 | – |
| Risc-OS | £33.35 | – |
| (Customer responsible for installation) | | |
| Rise in Crime | £29.95 | £24.95 |
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| System Delta Plus Ref Guide | £79.95 | – |
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U.I.M. is disc only and will run on BBC B or B+ with sideways RAM and Master Series Computers. The full colour Archimedes version is due for release 6th December.

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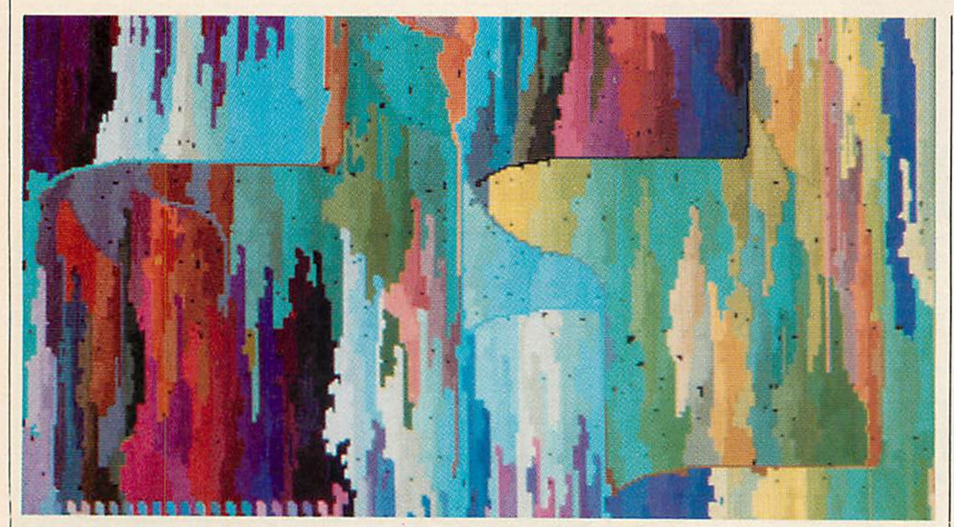
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# ARC AGORA

## PATTERN FORMING

**Produce some fascinating doodles, compacting files plus all you ever wanted to know about the sprites used in the desktop environment of Risc OS**

***David Acton***



It's odd how some of the best programs emerge from mistakes. One such example forms listing 1 and is a graphic oddment from Stuart Cupit of East Sussex.

Basically, Stuart's program is a flood-fill but the colours change as the filling progresses and you can design the way the fill happens. Some great patterns can be produced. £20 is on its way.

Before trying listing 1 you should ensure there is enough memory for a mode 13 screen (that is, 80K or more) and also that there is about 350K or more free for Basic to use.

On running the program, you will be asked whether you want the pattern to be random. Pressing Y causes a random 'path' to be set up and this is used when filling the screen. Alternatively, press N and draw your own design. Any mouse button can be used to plot your shape – press a key when you're ready.

The flood-fill routine is like others except the colour used depends on how far the filling has progressed. The program operates in mode 13 for speed and range of colours. PROCass assembles the flood-fill code and PROCuserdef is responsible for user-defined filling patterns.

Incidentally, GOTO statements are not generally welcomed in Agora but I'll make an exception just this once.

By way of an example, I've found a nice pattern by plotting four dots in a rough square and then drawing a rough circle in the middle. Happy doodling ...

## AGORA APPLICATIONS

Now that Risc OS is firmly established as the operating system of the Archimedes, many submissions to Agora are now appearing in the form of Risc OS applications. As you probably know, application directories contain not only the main Basic program !RunImage but several other files as well:

!Boot – executed when the directory in which the application lies is catalogued. This can be used to specify what to do with certain file types, merge sprites into the limp's common sprite pool and so on.

!Run – executed when the application is double-clicked or loaded in another way.

!Sprites – the limp-related sprites for the application.

!Templates – a window template file.

Such an array of odds and ends does pose a bit of a problem when it comes to publishing applications. Basic programs we can list but other data files we can't.

Listings 2 and 3 on the yellow pages are designed to get around the dilemma. Listing 2 takes a set of files, compacts them and spits them out as (check-summed) DATA statements. These can then be appended (by *EXECing) to the end of listing 3 and the resulting program, when run, will create all the necessary files.

Although the utility is really designed for Risc OS applications, you might well want to use it if you wish to submit other programs for publication. Obviously we don't want the yellow pages filled with DATA statements but it is a shame not to be able to carry good programs for the sake of a few awkward files.

To create your own 'Data-maker' program, proceed as follows. Run listing 2 ('MakeDat') and enter the name you want to give the temporary data file (the default is 'Dat').

Now enter the name of your application directory – '!MyApp' for example. Once a valid directory has been specified you will be asked if you want the files to be included automatically. Answering yes to this question will mean that all files in the directory other than Basic programs or ones called !RunImage will be included in your data file. If there are other files that you don't want to include reply 'N' to this question and specify each file in turn when asked.

When all the files have been included, the message 'Process complete' will be displayed and 'Dat' is ready. You might like to *TYPE DAT to see what's there – a series of Basic DATA lines starting at 1000.

Now load listing 3 and append the data lines by typing *EXEC Dat or whatever you called it. The data lines will be added to the listing. The data-maker is now com-

plete and, when run, will recreate all the files you specified.

To save on the typing end of things, the data is of course compacted. Listing 2 employs a fairly standard method of compaction using repeated strings.

The file is loaded and then examined byte-by-byte. In each case, the characters from the current position onward are checked to see if the same sequence has already been encountered. In fact, if more than two characters of the current string occurred within the previous 256 bytes they are compacted.

The length of the repeated sequence is encoded within a character and this is included in the final data with another byte specifying the offset of the repeated string. In fact, Ascii codes 130 to 162 are reserved for this. Thus, the following values may be included in the data:

| | |
|---|---|
| 0 to 129 | Simply character 0 to 129 |
| 130 to n | Character n |
| 131 to o | Repeat string of length 3 that occurred 'o' bytes ago |
| 132 to o | Repeat string of length 4 |
| ... | |
| 162 to o | Repeat string of length 34 |
| ... | |
| 163 to 255 | Simply character 163 to 255. |

Because characters 130 to 162 are designated 'special' if one of these actually needs to be included in the final file it is encoded as 130 n. The choice of this range of codes is rather arbitrary but as it works out, quite good for the sorts of files we wish to compact.

Other techniques will compress sprite files more efficiently but using this method provides a fair degree of compaction of text, graphics and other data.

Anyhow, all this data is spat out in the form of hex strings with a simple checksum at the end. (Checksum errors are detected by listing 3 which will report the DATA line in which the error lies). The names of the files and their types and attributes are also included as DATA statements, the list ending with *.

The expansion side of things is quite easy to understand. You'll see some IF statements checking for the special characters 130-162.

I expect we'll be seeing quite a few applications in Agora over the next few months. If you've written one then why not send it in? Shortish ones only for Agora please, though larger programs can of course be accommodated elsewhere within this glorious publication.

## WIMP SPRITES

Deep within Risc OS there lurks a whole set of sprites which are used by the desktop environment. Listing 5 on the yellow pages reveals all and shows the complete Risc OS gallery.

In fact, desktop sprites are stored in two places. The resident ones are in a block of memory in Rom, and in Ram there resides another area containing all those sprites which are subsequently added to the common sprite pool by applications (by using the command *IconSprites for example).

Listing 5 makes use of the SWI call Wimp_BaseOfSprites which returns the addresses of each sprite area. It takes no parameters and comes back with R0 pointing to the Rom sprites and R1 to those in Ram. PROClist takes such a base address and displays all the sprites it can find there.

The program works both within and outside the desktop environment and for this to be possible, the palette must be set to the desktop hues. This is done by calling Wimp_Palette which returns the red, green and blue levels for each of the 16 desktop colours.

Perhaps the most awkward feature about trying to display the desktop sprites is that they aren't all defined in mode 12. The conventional sprite plotting calls cannot therefore be used. However, Risc OS provides an easy way of getting around this problem.

Those of you who saw the short item about scaling sprites in a recent Agora will already be aware of the extension to OS_SpriteOp that allows the x and y dimensions of plotted sprites to be varied. The same call can also be used to convert colours according to a prepared conversion table.

So, for example, a mode 4 sprite can be displayed on a mode 12 screen even though the resolution and number of colours available differs greatly between the two modes.

The sprite call in question takes the following parameters:

```
SYS OS_SpriteOp,52,base,name,x,y,gcol,scale,colours
```

The first parameter can be 52, 52+256 or 52+512 depending on how you wish to refer to the sprite area. In the case of listing 5 you use 52+256, with base being the base address of the sprite area and you then name a pointer to the name of the sprite you've just found. The parameters x and y are screen co-ordinates and gcol is the GCOL action. (Refer to previous Agoras for details about plotting sprites with masks and so on).

Finally, scale is the address of a four-word scaling table and colours is the address of an (up to) 256-byte colour translation table.

The scale table contains four values: x-mul, y-mul, x-div and y-div say. Dimensions are multiplied by the 'mul' values and divided by the 'div' ones. If these were 1,5,3 and 1 respectively, the sprite would be squashed in the x-direction to one third of the width but would be stretched in the y-direction fivefold. The colour translation table simply contains a byte for each colour of the original sprite which is the nearest available colour in the current mode.

Fortunately there is another SWI – Wimp_ReadPixTrans which builds these two tables for us. You'll see it used in listing 5 in the yellow pages immediately before the sprite plotting call.

Incidentally, sprites that are from the Rom area have (R) displayed immediately after their names.

## £5 ONE LINER

For those of you who haven't seen the Risc OS credit list that is buried within the Roms, here's a little one-liner from William Hadden of County Down (in the country from which Ms McLemon, the *BAU* Goblette first sprang). Thanks go to William. His program is listing 4.

*Programs, ideas, hints and tips are always welcome – please send them to Arc Agora,* BBC Acorn User, *Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. Expose your talents to those who appreciate them – and get up to £20 too! Cor, can't be bad.*

# HINTS & TIPS

# COUNTING VIEW LINES

**Lots more on View, numberless listings, friendly keystrips, fast file copying and much more**

*David Atherton*

I have been taken to task by John Quillfeldt of Harrow for a throwaway remark in the August 1989 Hints and Tips, where I didn't fully explain the |L command in *View*, which counts lines.

John finds that he often needs to count lines in his documents, so for him, and anyone else who requires this in their *View* work, here is a complete exposition.

The |L variable, like all *View* variables, must be placed on a line which contains an embedded command. When the document is printed using PRINT or SCREEN, the number of lines at that point on the page will be displayed. So if you type a line as follows:

CE Lines=|L at this point

when you print the document, it will be displayed

Lined=23 at this point

You have to include the embedded command and of course it will be actioned, but as commands exist for left (LJ), right (RJ), and centred (CE) text, there should be no problem.

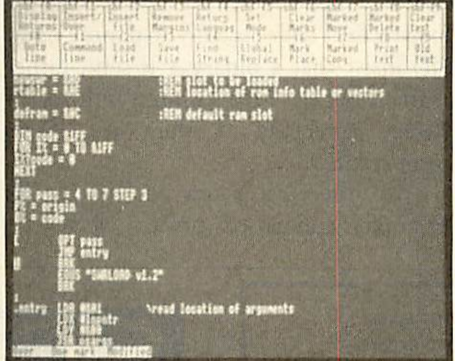
If you want to count the number of lines between two parts in a document, simply insert an |L variable at the start and finish points and SCREEN the file. Take a note of the two numbers. If they are on the same page, it is simple – just subtract one from the other. If they are on different pages, you will have to add the page length (as set by PL, default 66) multiplied by the page number minus one, to both values.

So if you are counting a section of text, and the first |L shows as line 23 on page 2, the second as line 8 on page 4 and default page length is in force (you haven't used any PL command in the document) then the calculation is:

Start : 66 * (2−1) + 23 = 89
End : 66 * (4−1) + 8 = 206

so the total number of lines counted is 117. Simple, really.

## £10
## EDITING LONG PROGRAMS



Alan Hodge from Bexley points out that the Master *Edit* program has a memory limitation (as pointed out in the Acorn Master Reference Manual Vol. 2 page K1-2) in that no program which occupies more than half of Basic's free memory can be edited. This is because *Edit* keeps a copy of the tokenised source and an Ascii copy in memory at the same time.

This limitation is a real bind at times. If programs exceed the memory limit while in the editor (if you type in a lot more lines) then returning to Basic (SHIFT-*f4*) loses both tokenised and Ascii versions of the program without any warning.

Even worse, only a part of the program is retokenised, so you may even miss the fact that the bottom part of your program has evaporated.

Alan's solution to the memory limitation is a small machine code program which enters the editor in a different way. The listing in the yellow pages assembles to produce a file called ED, which should be saved on disc.

Whenever you want to use the editor, instead of typing EDIT, type *ED and the editor will be entered, with your program in it. However, unlike the standard entry, there will be the full Master's memory available for editing.

Note that the editor always automatically selects shadow mode when entered. Note also, that because of this, there still may not be room to retokenise the program when you exit.

Therefore you should not simply leave the editor with SHIFT-*f4* but first save your edited program in Ascii format (using f3) and then exit to Basic (f1, then type Basic) and *EXEC the file back into the interpreter.

The program works by redirecting screen output to memory and executing a LIST command. Screen redirection is a simple matter of patching the OWSRCH vector so that it points to the routine 'list' which places the characters' output into consecutive memory locations.

After this has been done, the OSWRCH vector is reset. Then the program makes use of a special feature of *EDIT, the ability to invoke the editor by specifying the start and end block and memory of the text to be edited.

These parameters are slightly unusual – the syntax is *EDIT a,b where a is not the address of the text but the first address of a two-byte pointer to the text start address and b is the address of a similar pointer to the end.

So if the text is stored in memory from, say, &1F20-&2D45, then &20 is stored in byte &82, and &1F in byte &83 (low byte first format), then similarly &45 is stored in &84 and &84 and &2D in &85, the command:

*EDIT 82,84

will invoke the editor, with the correct text ready for editing.

Note the command does not require & in front of the parameters, however the addresses given must always be in hex notation.

£5

## VIEW HIGHLIGHTS WITHOUT A DRIVER

Jancsi Suto from Hull has written a letter with a rare gem – a supremely simple yet stunningly useful tip concerning *View* highlights.

All *View* users know how difficult highlights can be at times. Using the ordinary highlights is very restrictive but the syntax of the extended highlights is difficult at the best of times.

And of course, you always need to load a printer driver from disc and normal printer drivers can never offer that much in the way of features since they have to fit into 256 bytes of space.

Many users are familiar with the Epson code set – ESC E or F for emphasised text on or off, and so on. Wouldn't it be simple if you could just enter the Epson codes directly, without any need for a printer driver. Well, you can! The key to it all is the use of a simple command:

HT 1 27

(HT fits in the command margin – type *f8*,HT,RETURN,*1*,SPACE,*27*)

After this command, you can simply type in the text:

-E ROB: W.O.B. HYPHEN

and text will appear in emphasised mode until you type a:

-F.

Jancsi's printer is the Panasonic KX-P1124, which allows double height and double width. The commands are ESC W *1* for double width, and ESC *w 1* for double height. To achieve both simply type into *View*:

-W1-w1 WORDS

and the text will appear in the desired form. All this without a printer driver of any kind.

This technique is extremely interesting but there are just a couple of points to note. First, some Epson-compatible commands which require an 0 or 1 after the initial effect code (usually to denote on or off) insist that a binary 1 is sent, rather than an Ascii 1. Most printers will accept either, especially if they are FX80 compatible.

Also, there are a few commands (for example, condensed print – ESC 15) which require characters to be sent which are outside the Ascii range and therefore cannot be typed into *View*.

There is a solution even to these problems. To send a code is outside the Ascii range, you can temporarily define it as highlight 2. So to continue with the condensed print example, if the command:

HT 2 15

is inserted somewhere in the text, then using highlight 1 (SHIFT-*f4*) followed by highlight 2 (SHIFT-*f5*) would start condensed text at that point.

There are no further highlights but they can be redefined, so using the command:

HT 2 18

and then inserting both highlights again would turn condensed print off again.

The only drawback is that as a new command must be used, it would be impossible to use two non-Ascii codes in the same line.

Of course if you only wanted condensed print and no other effects, you could define the two highlights as HT 1 15 and HT 2 18 and just use them in





isolation (This is because character 15 works as condensed print as well as ESC 15).

The system works because the highlights used in *View* are simply converted to the byte values assigned to them with the HT command. If no drivers are used and no HT command is given, they do nothing.

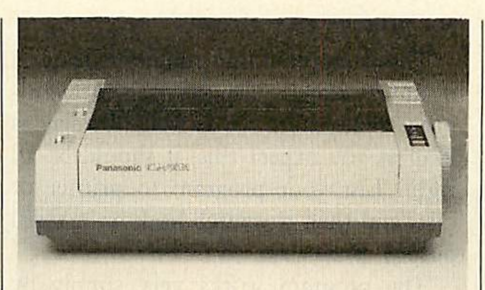
£5

## PRINTER TEST

Jeremy Solly from Chandler's Ford has written in with an old idea but one which has not been mentioned in these pages for a couple of years, so it's worth a fresh airing.

If your program requires the use of a printer, but you don't want to print without first making sure the printer is on, you can easily test this. All you have to do is attempt to print a character to the printer and then check whether the printer buffer is empty.

The printer buffer is empty if ADVAL(-4) returns a value of 63. If the buffer is not



empty, your printer is not connected, not on-line, not switched on or otherwise not working.

Of course, the problem with this is that by sending a character, you send something to the printer, which may not be what you want to print. It has been suggested in the past that you send an Ascii character 0, which normally has no effect on printers but even this can have side effects – some printers do respond to this code.

An alternative method is to send a character and immediately follow it with a 'delete' code (Ascii value 127). If the printer is off and the character is still in the Beeb's buffer, the delete character will ensure the character is deleted before it is printed. If the printer is on, then both codes will be sent to the printer but as virtually all printers respond to character 127 as a delete code, this will also ensure the character is never printed.

Another use of this delete idea involves sending listings to a printer. As you have probably discovered, when you type LIST CTRL-B to list a program on the printer, the nice neat effect is completely spoiled by a solitary > character appearing after the last line – the Basic prompt which appears, prior to pressing CTRL-C to switch off printing.

It is possible to suppress this last character with the delete code. Start the printed listing and while it is proceeding, type CTRL-A then DELETE then CTRL-C. You will find that the listing loses the > from the end.

What you have done is send a delete to the printer (CTRL-A, DELETE is the same as VDU1,127) and switched the printer off as well. The three keystrokes remain in the keyboard buffer until the printing is finished and are then passed to the printer buffer in the normal way.

The same method can be used to test other buffered I/O, for example, whether you have made a serial connection to a printer or other computer.

£5

## LIST WITHOUT LINE NUMBERS

```
REM NoLine List
REM by Jason O'Broin
REM for B/B+/E/M/C with Basic 2
REM (c) BAU Dec 89
```

Regular Hints and Tips contributor, Jason O'Broin of Brampton has sent in a useful utility this month for those of you who like to see their Basic programs without those cumbersome line numbers.

This has a number of uses. For example, a program can simply be viewed or printed more neatly or it can be spooled to disc for editing in the Master Edit program (or for that matter, *Wordwise* or *View*) without line numbers.

When the file is in Ascii format, it needs no line numbers and these can be added automatically by saving the file with the keyboard AUTO on the first line then EXECing the file back into Basic.

The program in the yellow pages assembles to make a machine code file called NoLine. Run this (*NOLINE) and the first five characters of each line are not printed.

This disposes of line numbers although it unfortunately disposes of the beginnings of anything else as well, however as long as you expect this, it should be all right. List your program to printer or disc, and then to switch back on normal output, press CTRL-D.

The program works very simply by intercepting OSWRCH and every time a carriage return is printed, it resets a counter. On subsequent calls, the counter is incremented and while it is below six, the character is not printed. After six, the characters are printed as normal.

The net effect is to inhibit the first five characters of each line, which in Basic listings always contain the line number.

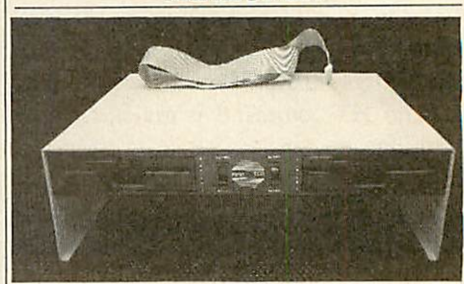
When CTRL-D is pressed, the routine detects this (CMP #4) and 'unhooks' the interception routine, restoring default vectors. CTRL-D or VDU4 was chosen as this has no real side effects.

It selects text mode, which is almost certainly the mode you were already in if you were attempting to print a listing in the first place.

Once the routine is 'unhooked' in this manner, it must be *RUN again to work.

£5

## DFS TO ADFS TRANSFER



Hints and Tips regular Joe Abley finds the 'Copyfiles' program on the Master Welcome disc a bit cumbersome and I must agree with him.

It does the job but you have to give it an awful lot of information before any files actually get moved. The *MOVE command on the Master is similarly limited – it will only copy one file at a time and works because it uses a limited buffer space.

Joe is of the opinion that most DFS to ADFS transfers simply involve copying an entire DFS disc to an ADFS disc or subdirectory. To do this you only need two pieces of information: the name of the DFS source drive and the name of





the ADFS directory path.

For example, if you have your DFS disc in drive 0 and a blank ADFS disc in drive 1, and you don't want to bother with subdirectories, then type '0' in response to the first question, and ':1.$' for the second.

If you already know which directory ADFS is set to, you can type only the directory path from where you are – if ADFS is set to :1.$.PROGS and you want to transfer the DFS files to L1.$.PROGS.DFS then you need only type DFS in response to the prompt.

Note that the subdirectory you specify must already exist on the ADFS disc.

After giving this information, the program will find every file on the DFS disc and transfer it to the specified ADFS directory. Often files are in separate DFS directories but they are not really required to go into separate ADFS directories. If the program finds a file called say B.START, it doesn't create a subdirectory B, but instead saves the file in the target directory under the name B//START.

If the directory in question is not part of a legal ADFS, for example directory '!' then the Ascii number of the directory is used instead – !.PROG would transfer as 33/PROG. Files in the $ directory of the DFS disc are simply copies under their existing filenames.

Note that the copier is intelligent enough to cope sensibly with large files, bigger than the available memory. These are copied in chunks using OSGBPB (the fastest method) but if the file is short enough to be copied in one go, the much quicker *LOAD and *SAVE are used.

There is however one small drawback. The program does not cope with files where an ADFS illegal character has been embedded in the main part of the filename. For example !.!!!!!!! and $.WP.ROM are legal DFS filenames but these would not transfer using this copier.

You can extend the program to cover these features and to copy the title of the DFS disc into the title string of the subdirectory on the ADFS disc. You can have a separate *TITLE string in each ADFS subdirectory, which by default is set to the directory name but can be changed using *TITLE while in the relevant subdirectory. The title shown when you first mount the disc applies to the $ directory only unlike the DFS title, which is a title for the whole disc.

**£5**

## KEYSTRIPS AGAIN

Graham Campbell from Hathern has supplied a few alterations to Andrew Hinchcliffe's keystrip program in the September issue, making the program a little more user-friendly. Type or load in the existing program as listed, then add the following lines.

```
   80 INPUT "Number of s
trips : " T%
   85 INPUT "Number of s
lots (1-3) : " numbox%
   90 INPUT LINE ''"Titl
e : " title$
  230 title$=title$+STRI
NG$(81-LEN title$," ")
  360 ?&70=ASC MID$(titl
e$,F%,1)
  480 IF I%=1 OR I% MOD
(W%/numbox%)=0 E%=G%
```

This will allow you to change the number of strips, slots and the title string directly. Also, programs often don't need entries for 'normal f-key', 'SHIFT f-key' and 'CTRL f-key', so if you alter line 480, you can produce either one big slot with MOD(w%/1) or an equal division with MOD(w%/2).

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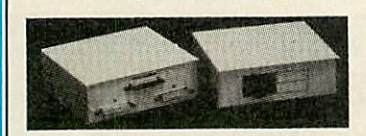
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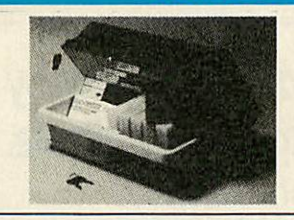
## DATA SWITCH BOX



Available in RS232 or Centronics

| | | | |
|---|---|---|---|
| 2-Way | £19.50 | 4-Way | £25.50 |
| 3-Way | £22.50 | Cross Over | £27.50 |

## DISK STORAGE BOXES



| | | |
|---|---|---|
| 5¼" | 50 | £6.90 |
| 5¼" | 100 | £7.90 |
| 5¼" | 140 | £9.90 |
| 3½" | 50 | £6.75 |
| 3½" | 100 | £8.90 |

All Storage Boxes are with Lock and come with 2 Keys

## INTERFACE CONVERTERS

CONVERTERS FOR THAT DIFFICULT CONNECTION BETWEEN SERIAL AND PARALLEL DEVICES

| | |
|---|---|
| SP200 Serial to Parallel | £62.50 |
| PS200 Parallel to Serial | £62.50 |
| SXP 300 BI Directional | £99.00 |

## DUST COVERS

| | | |
|---|---|---|
| Acorn Archimedes | 2 PC | £8.50 |
| BBC Master 128 | 1 PC | £4.50 |
| BBC Master Compact | 2PC | £7.50 |
| Acorn A 3000 | 1 PC | £5.50 |
| Printers 80 Col | | £4.50 |
| Printers 132 Col | | £5.50 |

## COMPUTER PAPER

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| | |
|---|---|
| 11 × 9½" 60 gsm 2000 | £16.90 |
| A4 11⅔ × 9¼" 85 gsm 1000 | £14.90 |

## COMPUTER LABELS

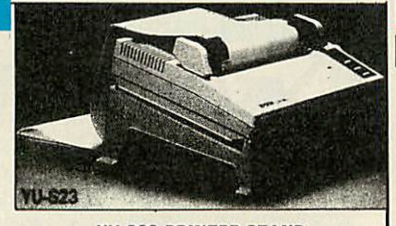
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|---|---|
| 3½ × 1⁷⁄₁₆" | £10.90 |
| 4 × 1¹⁄₁₆" | £11.90 |

## PRINTER STANDS



**YU-S25 K/D PRINTER STAND**
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YU-S25A: for 80 col. printer. £27.90
YU-S25B: for 132 col. printer. £32.50




**YU-S23 PRINTER STAND**
Securely holds any printers wide or small. Made of molded plastic. **£10.50**

## DISK HEAD CLEANER WITH FLUID

3" **£4.50** 3½" **£3.50** 5¼" **£2.75**

## COPY HOLDERS

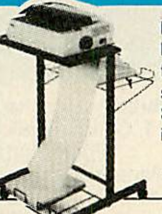


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|---|---|
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## PRINTER BUFFERS



Parallel printer buffer memory with copy bypass and reset

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|---|---|
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| PB 64K 2 IN 1 OUT | £ 95.00 |
| PB 256K 1 IN 1 OUT | £145.00 |
| PB 256K 1/2 IN 2/1 OUT | £169.00 |

## PRINTER CABLES

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|---|---|
| IBM PC/Amstrad/Compatible 25 PIN-36 PIN | £7.50 |
| RS232M/M | £8.50 |
| RS232M/F | £8.50 |
| CENTRONICS/CENTRONICS | £8.50 |




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| A310 1024K RAM Single 3.5" Drive | £835.00 |
| A310M | £895.00 |
| A410/1 1024K RAM Hard Disc Controller built in | £1199.00 |
| A420/1 | £1699.00 |
| A440 4MB RAM 20 MB Hard Disc | £2409.00 |
| * NEW from Acorn the A3000 available soon | £649.00 |

## ARCHIMEDES ACCESSORIES

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|---|---|
| Archimedes Programmers Reference Manual | £29.95 |
| Archimedes RISC OS | £29.00 |
| Archimedes Podule Back Plane | £39.00 |
| Archimedes ROM Podule | £56.00 |
| Archimedes I/O Podule | £78.95 |
| Archimedes Midi I/O Add-on | £39.00 |
| Archimedes Midi Podule | £69.00 |
| Archimedes Econet Podule | £43.00 |
| Archimedes PC Emulator | £95.00 |
| Archimedes 3.5" Floppy Drive Unit | £108.00 |
| Archimedes 20Mb Hard Disk inc Controller | £469.00 |

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|---|---|
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| Master Econet module | £43.47 |
| Compact PAL TV Adapter | £26.00 |
| Compact RS232 kit | £26.00 |
| Compact 2nd Floppy Drive | £88.00 |
| Master Turbo Upgrade | £108.00 |
| Master ROM/RAM Cartridges | £11.95 |
| Master Reference Manual 1 | £14.95 |
| Master Reference Manual 2 | £14.95 |
| Filestore E01S | £899.00 |
| Filestore E40S | £809.10 |
| Filestore E60S | £1078.10 |
| Printer Server EPROM | £39.00 |
| Master Fileserver Utilities Disc | £17.35 |
| Econet Bridge | £169.00 |
| Econet Starter Kit | £89.00 |
| Econet Socket Kit | £29.00 |
| 10 Station Lead Set | £29.00 |
| 100m Cable | £86.00 |
| Disk upgrade kit | £84.00 |
| Econet upgrade kit | £60.00 |
| 1772 upgrade kit | £49.00 |
| 64K upgrade kit for B+ | £34.74 |
| ATPL ROM/RAM expansion | £35.00 |
| Torch ZEP 100 Z80 upgrade | £229.00 |

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|---|---|
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| Programmers Toolbox- Emmerichs | £19.45 |
| 15 Hour W.P. BBC/Wordwise & + | £5.95 |
| 15 Hour W.P. Use BBC VIEW | £5.95 |
| 30 Hour BASIC Standard Ed. | £12.95 |
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| Euclid | £39.13 |
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| Logistix | £99.00 |
| Prolog X | 199.00 |
| Twin | £29.00 |
| Conqueror | £19.95 |
| Zarch | £17.35 |
| Comal | £43.35 |
| View | £52.00 |
| View Professional | £99.00 |
| Viewindex | £13.00 |
| Viewsheet | £52.00 |
| Viewspell | £34.74 |
| Viewstore | £52.00 |
| Fourier Analysis | £40.00 |
| Autosketch | £79.00 |
| Pixel Perfect | £79.50 |
| Library Dewey Classification | £8.26 |
| Hearsay | £61.00 |
| Masterfile | £19.13 |
| BBC-Arc Disc Con kit | £14.00 |
| Spelling Checker | £50.00 |
| Text Editor | £5.00 |
| OS & Gr. Lib for F77 | £43.43 |
| Printer Module | £12.50 |
| XED Text-File Editor | £16.95 |
| Archi BBC Ser. Link | £13.51 |
| DFS Utilities | £18.26 |
| Fontaid Star | £31.30 |
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| Archimedes Tool Kit Module | £34.74 |
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| Farmcash | £169.00 |
| Milkman | £295.00 |
| TeX | £50.00 |
| Adminstrator's Friend | £40.00 |
| EMR Arpeggio Music Sys. | £29.95 |

## PRINTERS

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| Brother M1109 100cps dual interface | £175.50 |
| Brother M1209 140cps dual interface | £229.50 |
| Brother M1409 190cps 110 column dual | £375.50 |
| Brother M1709 200cps 136 column LQ/IBM | £445.00 |
| Brother M2518 360cps 136 column LQ app | £795.00 |
| Brother M4016 16 pin 480cps dual interface | £1299.00 |
| Brother M1724 24 pin 160cps LQ | £599.00 |
| Brother Twinwriter 180cps Matrix/Daisy Wheel | £895.00 |
| Citizen 120D 120cps + NLQ +4K | £145.00 |
| Citizen 180E 176cps + NLQ +4K | £199.00 |
| Citizen MSP 16E 160cps +NLQ +8K 132 column | £289.00 |
| Citizen MSP 40 240cps + NLQ + 8K | £345.00 |
| Citizen MSP 45 as MSP 40 with 132 column | £485.00 |
| Citizen MSP 50 300cps +NLQ + 8K | £485.00 |
| Citizen MSP 55 as MSP50 with 132 column | £649.00 |
| Citizen HQP 40 24 pin + 200cps +24K | £449.00 |
| Citizen HQP45 as HQP40 with 132 column | 459.00 |
| Citizen Col. Kit for MSP 50/55 + HQP 40 | £60.00 |
| Epson LX800 150cps 80 column + NLQ + tractor/friction | £199.00 |
| Epson FX850 200cps 80 column + NLQ +tractor/friction | £379.00 |
| Epson FX1050 204cps 132 column + NLQ + tractor/friction | £478.00 |
| Epson EX800 250cps 80 column + NLQ + (optional colour) | £503.00 |
| Epson EX1000 250cps 136column + NLQ + (optional colour) | £699.00 |
| Epson DFX5000 533cps 136 column + NLQ + 2 tractors | £1349 |
| Epson LQ500 24 pin 150cps 80 column + parking | £319.00 |
| Epson LQ 850 220cps 24 pin 80 column dual interface | £525.00 |
| Epson LQ860 24 pin 290 cps 80 column colour | £692.00 |
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| Epson LQ1060 24 pin 220cps 136 column colour | £863.00 |
| Epson LQ2550 24 pin 270 cps 123 column dual interface | £1039.00 |
| Epson TLQ 4800 48 pin 300cps 136 column | £1895.00 |
| Juki 7100 24 pin 288cps + NLQ + dual interface | £540.00 |
| Juki 7200CP 24 pin 324cps NLQ + colour parallel | £1349 |
| Juki 7200CS 24 pin 324cps +NLQ + colour serial | £1349.00 |
| NEC P2200 24 pin 140/56cps + 80 column | £349.00 |
| NEC P6+ 24 pin 286/90cps + 80 column | £569.00 |
| NEC P7+ as P6+ with 132 column | £759.00 |
| NEC P960XL 384/107cps parking 132 column | £949.00 |
| Star FR10 300cps 80 column NLQ | £413.00 |
| Star FR15 300cps 132 column NLQ | £539.00 |
| Star NX15 170cps 136 column NLQ | £349.00 |
| Star ND15 180cps 136 column NLQ | £440.00 |
| Star NR15 240cps 136 column NLQ | £529.00 |

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| Brother HR20 22cps + dual interface | £499.00 |
| Brother HR40 40cps including Street Feeder | £875.00 |
| Brother Twinwriter Matrix/Daisy Wheel | £895.00 |
| Citizen Premier 35cps | £699.00 |
| Juki 6200 30cps 132 column | £349.00 |
| Juki 6300 40cps 132 column | £629.00 |
| Juki 6600 132 column dual interface | £829.00 |
| Olympia ESW 1000C 17cps 120 column | £359.00 |

### LASER

| | |
|---|---|
| Brother HL8 8ppm Multi Emulation | £1895.00 |
| Brother HL8QS 40cps including Postscript | £4400.00 |
| Citizen Overture 110+ dual interface | £1399.00 |
| Citizen Overture 105 6ppm including HP Emulation | £1295.00 |
| Citizen Overture 112 12ppm HPII Emulation | £1995.00 |
| Epson GQ3500 6ppm including HP Emulation | £1395.00 |
| Star LP-8 8ppm 1MB | £1895.00 |

### PLOTTERS

| | |
|---|---|
| Roland DXY 880A A3 Plotter | £599.00 |
| Roland DXY 890 A3 Plotter | £1199.00 |
| Roland DXY 1100 Flat Bed Plotter | £699.00 |
| Roland DXY 1200 Flat Bed Plotter | £999.00 |
| Roland DXY 1300 Flat Bed Plotter | £1199.00 |
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| 420/1 | £1699 | £1899 |
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| 1Mb RAM+20Mb HD | £299 | 3Mb RAM+20Mb HD | £499 |
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| RISC OS Prog Ref Manual | £79(b) |
| Econet Module | £49(c) |
| Ethernet Card for R140 | £449(b) |
| Floating Processor Unit | £599(b) |
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| Techno 40Mb 28 ms | £299(a) |
| Techno 49Mb 28 ms | £369(a) |
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| 49Mb (cased & psu, cables) | £439(a) |
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| Arc/BBC Serial Cable | £7(d) |
| Arc PC Serial Cable | £7(d) |
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| Arc Keyboard Extn lead | £7(d) |
| Arc Scart Lead | £7(d) |
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|---|---|
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| System Delta Plus Prog Ref Manual | £25(d) |
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We can provide attractive discounts to Education Authorities, Schools, Colleges and Health Authorities. Simply phone us or write, outlining your requirements, and we will supply a quotation.

# TECHNOMATIC

Techno House 468 Church Lane, London NW9 8TQ. Tel: 01-205 9558 Fax: 01-205 0190

## *techno*SCAN

A versatile hand held scanner for Archimedes offering four monochrome resolutions (100, 200, 300 & 400 dpi) as well as having 4 different modes of operation to select gray scaled or monochrome images.
Software is fully integrated with the multi-tasking RISC OS and utilises the desktop environment to facilitate easy incorporation of scanned images into RISCOS compatible DTP, WP, art or drawing package.
The scanning area is 4″ wide and vertical height is limited only by memory constraints. The image brightness is adjustable to obtain the optimum quality. Tone selector allows different settings for text and photos.
Software appears as an icon on the icon bar from where all its facilities can be accessed. Software features include:
Visual rescaling of either X or Y axis, X & Y flips, colour tinting, picture cropping, on screen help, etc. RISC OS's anti aliasing feature is utilised to enhance the image quality.



Scanned images can be saved as sprite file or dragged into other applications. The images can be output to compatible printer as a sprite using one of the RISC OS versatile printer drivers.
The manual is written in easy to follow style with hints and tips for getting the best results. The manual together with interactive on-screen help gets you going almost immediately you have installed the scanner. On screen warning appears if the image is being scanned too fast. Real time scanning would normally be used to setup the various controls for the best results and then off screen scanning would be carried out for the final scan to ensure uneven scanning speed does not leave tell-tale lines of lost data on the image.

***techno*SCAN complete with interface card and manual** **£149(b)**

## Genius Digitising Tablet

Latest model of Genius GT1212A PC tablet adapted for use with Archimedes offers resolution of 1000 lines/in over a 12″ × 12″ working area and connects through the serial port of the computer.
Tablet is supplied with a four button puck controls, an optional two button stylus with switched tip is also avaiable.
The software to drive the tablet is supplied as a module to operate within the RISC OS desktop environment. Once loaded several commands are available to control the tablet, ie commands to turn it on or off, to select relative or absolute coordinates etc. Three puck buttons act as standard mouse buttons and the fourth allows special operations like changing the size of the tablet work area.
The tablet can virtually take over all the functions of a mouse making the use of graphics packages much simpler. The option stylus will make tracings, line drawings etc much easier and more accurate.

| | |
|---|---|
| **GT1212A Tablet** | **£259(a)** |
| **Optional Stylus** | **£35(d)** |

## MULTI I/O Podule

A low cost card provides: **Video Digitiser, Sound Sampler,** a full RS232 interface, 3 ROM skts & joystick interface within RISCOS environment.
Details on request. **£117(b)**

## MASTER SERIES

*Phone for details on special offer for Master Systems.*

**AMB15** Master 128 **£439(a)**

***The Master package includes: View Word processor and Viewsheet spreadsheet software and EITHER Educational/Fun software bundle with STARdataBASE package.***

| | | | |
|---|---|---|---|
| **ADC06** Turbo 65C102 Module | **£115(c)** | | |
| ADF10 Econet Module | **£49(c)** | Acorn Rom Cartridge | **£13(d)** |
| ADJ22 Ref Manual I | **£14(c)** | ADJ23 Ref Manual II | **£14(d)** |
| TRC32 32K RAM Cart. | **£15(d)** | Master Dust Cover | **£4.75(b)** |
| Universal CoProc Adapter | **£49(b)** | | |
| BBC Domesday System | **£2,500(2Xa)** | | |

## ECONET ACCESSORIES

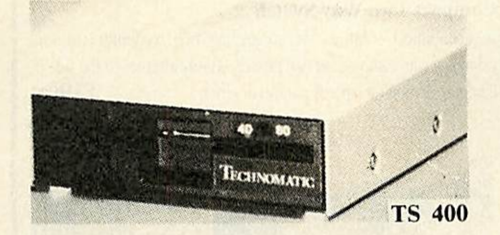
| | | | |
|---|---|---|---|
| Stacking Filestore EOIS | **£999(d)** | | |
| Filestore Hard Disc E40S | **£899(a)** | | |
| Filestore Hard Disc E60S | **£1119(a)** | | |
| Econet Startet Kit | **£85(b)** | Econet Bridge | **£174(b)** |
| Econet Socket Set | **£29(c)** | Printer Server Rom | **£41(d)** |
| File Server Level II | **£75(d)** | 10 Station Lead Set | **£34(d)** |
| Master FS Utility Disc | **£17.25(d)** | | |

Special schemes exist for teachers to purchase Archimedes A3000. Please contact us for details

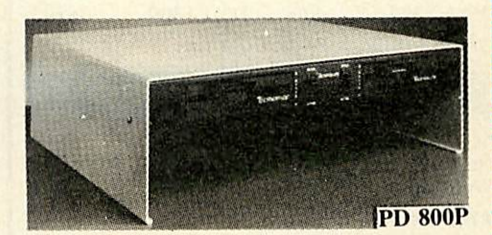
**Attention all TEACHERS**

## TECHNOMATIC DISC DRIVES

A range of high quality high performance drives to meet the needs of all BBC Micro Users.
*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering fast track access and head setting times.
*5.25″ floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.
*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with a suitably fused 13A moulded plug.
*Our plinth drives have been thoughtfully designed and provide a choice of two 5.25″ drives or a combination of 5.25″ and 3.5″ drives.




TS 400



PD 800P

**5.25″ Single Drives 40/80 switchable:**

| | |
|---|---|
| **TS400** 400K/640K | **£80(b)** |
| **PS400** 400K/640K with integral mains power supply | **£90(b)** |

**5.25″ Dal Drives 40/80 switchable:**

| | |
|---|---|
| **TD800** 800K/1280K | **£160(a)** |
| **PD800** 800K/1280K with integral mains power supply | **£170(a)** |
| **PD800P** 800K/1280K with integral mains power supply and monitor stand | **£185(a)** |
| **PD800** Case with psu & data cable | **£42(b)** |
| **PD800P** Case with psu & data cable | **£75(a)** |

*PS400/PS351 are Compact/Archimedes compatible.*

*PD800/PD352/PD853 are Archimedes compatible.*

**3.5″ 80T DS Drives:**

| | |
|---|---|
| **TS351** single 400K/640K | **£69(b)** |
| **PS351** 3.5″ single drive with integral mains power supply in a 5.25″ case. | **£95(b)** |
| **TD352** Dual 800K/1280K | **£126(a)** |
| **PD352** 3.5″ dual drive with integral mains power supply in a 5.25″ case. | **£139(a)** |

**Combo Drives (5.25″ & 3.5″ drives)**

| | |
|---|---|
| **PD853** | **£170(a)** |
| **PD853** psu and plinth mounting | **£190(a)** |

**DISC DRIVE MULTIPLEXER**
***For Master, B, B + and any DFS/ADFS***

| | |
|---|---|
| ***TDM2*** Two computers/one drive unit | **£65(b)** |
| **TDM4** Four comptures/one drive unit | **£115(b)** |

## WINCHESTER DRIVES

Most popular range of Winchesters for BBC. Drives are housed in metal casing fan cooled and powered by switch mode psu for quiet, efficient and reliable operation.
Front end utility for Master, format and verify program and Tree Plan directory structuring utilities are included as standard.

| | |
|---|---|
| **P30HD 30Mb drive** | **£410(a)** |
| **P304HP 30Mb + 40/80T Floppy DS (plinth mounted)** | **£609(a)** |

## UPGRADEs FOR MODEL B

| | |
|---|---|
| Acorn 1772 DFS Kit | **£49(d)** |
| ADFS ROM | **£26(d)** |
| Econet Kit | **£55(d)** |
| ATPL ROM/RAM Expansion Board | **£37(c)** |

## 3M FLOPPY DISCS

**5.25″ Discs in packs of 10**

| | |
|---|---|
| **744** 40T SSDD | **£5(d)** |
| **745** 40T DSDD | **£6.50(d)** |
| **747** 80T DSDD | **£9(d)** |
| **3.5″ DSDD Discs** | **£9(d)** |

**NEW LOW PRICES**

## BULK DISCS

| | |
|---|---|
| 50 5.25″ 40 T single sided discs with sleeves in lockable box. | **£20(b)** |
| 50 5.25″ 80 T double sided discs with sleeves in lockable box. | **£25(b)** |
| 40 3.5″ 80T DS Discs in lockable box | **£38(b)** |
| **Drive Head Cleaning Kits (5.25″ or 3.5″)** | **£4 (d)** |

**LOCKABLE DISC STORAGE BOXES**

| | | | |
|---|---|---|---|
| 3.5″ 40Discs | **£6(c)** | 80 Discs | **£7(c)** |
| 5.25″ 50Discs | **£6(c)** | 100Discs | **£7(c)** |



All prices ex VAT and subject to change without notice. See page 6 for Carriage Charges.

# TECHNOMATIC

Techno House 468 Church Lane, London NW9 8TQ. Tel: 01-205 9558 Fax: 01-205 0190

## PRINTERS & PLOTTERS

### EPSON

| | | | |
|---|---|---|---|
| LX400 | £130(a) | FX850 | £295(a) |
| LX850 | £180(a) | FX1050 | £395(a) |
| LQ400 | £199(a) | LQ550 | £265(a) |
| LQ850 | £399(a) | LQ1050 | £569(a) |
| LQ860 | £529(a) | LQ1060 | £649(a) |
| EX800 | £429(a) | EX1000 | £530(a) |
| LQ2550 | £899(a) | SQ2550 | £929(a) |

GQ3500 Laser £1400

### NATIONAL PANASONIC

KXP1081 incl Master Lead £139

KXP1124 £249 KXP1540 £435

### INTEGREX

132 Inkjet Colour £515

COLOURCELL Inkjet £2750

### PLOTTER

Hitachi 672XD A3 4 col £409

Plotmate A4S £379

Plotmate A3M £549

**Roland A3 FLATBED PLOTTERS**

DXY880A £510 DXY1100 £625

DXY1200 £865 DXY1300 £1025

*All above items are carriage (a).*

### STAR

LC10 £139 LC10 Col £189

LC24-10 £269 NB24-10 £459

### TAXAN

KP815 £155 KP915 £275

### NEC

P2200 £269 P6+ £439

P7+ £579

### HP

Laserjet Series II Lazer £1249

Deskjet Plus £569

## PRINTER ACCESSORIES

**SERIAL INTERFACES**

Epson 8143 £32(d) Epson 8148 (8K buffer) £79(d)

Nat Pan KXP17 £39(d) Taxan £49(d)

**RIBBONS**

| | |
|---|---|
| LX80/86/800, MX/RX/FX80/85/800/850 | £4(d) |
| MX/RX/FX100, FX105/1000/1050 | £6(d) |
| LQ500/800/850 | £5(d) |
| LQ1000/1050, EX800/1000 (Black) | £8(d) |
| EX800/1000 | £16(d) |
| LQ2550, JX80 | £13(d) |
| StarLC10/NL10, NatPan KXP1081 | £4(d) |
| LC10 Colour | £6.50(d) |
| Taxan 810/815/910/915 | £5.75(d) |
| Integrex Black Cartridge | £10.50(d) |
| Integrex Colour Cartridge | £16(d) |
| Juki 6100 £1.80(d) Brother HR15/20 | £4(d) |
| HI80 Pens (4) (Aqueous or Oil Based) | £6.90(d) |
| Hitachi Pens (6) Aqueous £18.50(d) | Oil £25(d) |
| Colour option EX800/1000 | £35(d) |

**CUT-SHEET FEEDERS**

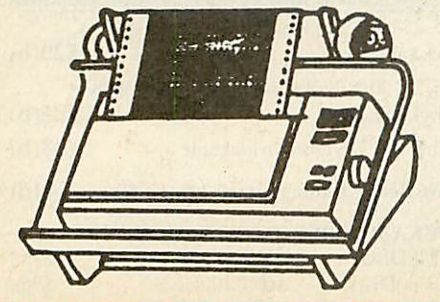
| | | | |
|---|---|---|---|
| LX800 | £70(b) | LQ500 | £75(b) |
| FX/LQ/800/850 | £135(b) | FX/LQ1000/1050 | £179(a) |
| EX800 | £150(b) | EX1000/LQ2500 | £210(a) |
| Star LC10 | £55(b) | Brother HR20 | £229(a) |

**TRACTOR FEEDS**

| | | | |
|---|---|---|---|
| LQ800 | £44(b) | LQ1000 | £55(b) |
| LQ850 | £70(b) | LQ1050 | £85(b) |

## PRINTER STAND

A new style printer stand with easy paper feed and paper seperation, provides complete access to paper. Can be used with both top and bottom paper feed. Very space efficient. **£26 (b)**

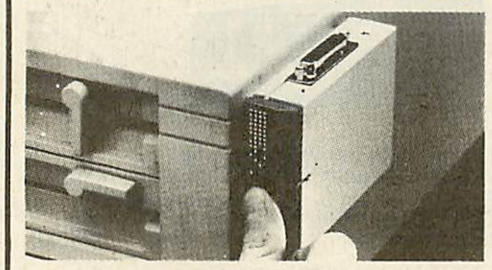


## BUFFERS & SHARERS

**TSB 256 Auto Sharer/Buffer**
256K buffer with 3 input ports. Each port scanned automatically every 10 secs until data found. PAUSE, COPY and RESET Facitilies. Full spec on request. **£169(a)**

**Smart Printer Buffer 256K**
256K parallel buffer with facilities for 256 copies, PAUSE, RESET & SELF-TEST **£149(b)**

**Compact Two Way Switch**
A economical solution for connecting two computers to one printer or one computer to two printers. Easily attaches to the side of compute or monitor (specify parallel or serial) **£19(c)**



**Manual Printer Sharers:**

| (All lines are switched). | Parallel | Serial |
|---|---|---|
| 2 computers to one printer | £23(c) | £23(c) |
| 3 computers to one printer | £30(c) | £30(c) |
| 4 computers to one printer | £36(c) | £36(c) |
| 2 computers to 1 or 2 printers | £49(c) | £49(c) |

*Cable sets for above sharers available for all popular computers*

**BBC Computer Sharer: TCS26**
1 computer to 2 printers fitted with BBC cable £15(c)

**Parallel Printer Leads**

BBC/Master (1.2m) £5(d) BBC/Master (2m) £7(d)

Archimedes (2m) £7(d) Compact (1.2m) £7(fd)

**Paper & Labels**

Plain fanfold paper with microperforations:

| | |
|---|---|
| 2000 sheets: 9.5" x 11" | £11(b) |
| 14.5" x 11" | £18 (£4.50) |
| 1000 sheets: A4 80gsm | £11(b) |
| A4 90gsm | £12(b) |
| 500 Loose A4 plain sheets | £3(c) |
| 50 sheets Art paper 115gsm A4 £3(c) A3 | £5(c) |
| 100 sheets A4 OHP film | £45(b) |

**Labels/1000**

| | |
|---|---|
| Single Row 3½" x 1⁷⁄₁₆" | £5(d) |
| Double Row 3½" x 1⁷⁄₁₆" | £5(d) |
| Triple Row 2⁷⁄₁₆" x 1⁷⁄₁₆" | £5(d) |

## MONITORS

### 12", 14" and 20" MONITORS

**Microvitec 1431**
Std Res, 14" **£175(a)**

**Microvitec 1431AP**
Std Res + PAL/Aud, 14" **£199(a)**

**Microvitec 1451**
Med Res, 14" **£219(a)**

**Microvitec 1451AP**
Med Res + PAL/Aud, 14" **£255(a)**

**Microvitec 1441**
Hi Res, 14" **£359(a)**

Dust Cover for Microvitec 14" monitors **£5.50(d)**

**Philips 8833 14" RGB**
Med Res, 14", high contract screen, TTL/Linear input, Mono/Colour Switch Stereo Sound Input. Separate controls for brilliance and contrast. **£199(a)**

**Touchtec 501** **£239(a)**

**Acorn Philips**
14" Colour Monitor **£199(a)**

**Microvitec 2030CS**
20" Standard Resolution RGB/ Comp Video **£380(a)**

**Microvitec 2040CS**
20" High Resolution RGB/Comp Video **£675(a)**

**TAXAN SUPER VISION 625**
12" Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible. **£269(a)**

**TAXAN 770+**
MultiSysnc Autoscan 14", ideal for utilising te hi res modes on Archimedes. Our price includes a tilt & swivel stand **£419(a)**

**VIKING II**
19" Hi Res white screen monitor for CAD applications c/w Tilt & Swivel stand **£849(a)**

**CM1686 16"**
Hi Res colour monitor for use with hi res modes on 400 series. Res: 1280 x 1024. Complete with tilt & Swivel base **£1249(a)**

### MONOCHROME MONITORS

**PHILIPS 7502**
Hi Res green screen **£72(a)**

**PHILIPS BM 7522**
Hi Res amber screen **£79(a)**

Tilt & Swivel Stand for Philips Mono **£6(c)**

### MONITOR ACCESSORIES

| | |
|---|---|
| Microvitec Swivel Base (14" plastic monitors) | £10(c) |
| Monitor Stand Models B & B+ | £10(c) |
| Monitor Stand Master | £13(c) |
| Double Tier Stand Models B, B+ or Master | £24(b) |
| Taxan RGB Lead | £7(d) |
| Microvitec Lead | £4(d) |
| Monochrome BNC/Phono Lead | £4(d) |
| Copy Holder Self Supporting A4 | £15(c) |
| General purpose tilt and swivel stand for 12" and 14" Monitors | £12(b) |

## MODEMS & SOFTWARE

| | | | |
|---|---|---|---|
| MIRACOM WS4000 V21/V23 | £115(b) | Termulator (B/B+) | £25(d) |
| MIRACOM WS3000 V22 | £275(b) | Termulator (M) | £35(d) |
| MIRACOM WS3000 V22bis | £395(b) | MAYA (B/B+/M/Arc) | £49(d) |
| PACE LINNET V21/23 | £129(b) | Commstar II (B/B+/M) | £28(d) |

*All modems carry a BABT Approval*

All prices ex VAT and subject to change without notice. See page 6 for Carriage Charges.

# TECHNOMATIC

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## BBC FIRM/SOFTWARE

### INTEGRATED PACKAGES

| | |
|---|---|
| **MEGA 3 ROM** | £76(c) |
| Three ROMS in one Interword/Intersheet/Interchart | |
| MINI OFFICE | |
| The most economical package you can buy. | |
| Disc for Model B & B+ | £14(d) |
| Disc for Master | £16(d) |
| Disc for Compact | £19(d) |
| **(please specify 40 or 80T Disc)** | |
| ROM Version (B,B+, M&C) | £43(c) |

### WORD PROCESSORS

| | |
|---|---|
| Acorn View Professional | £50(c) |
| VIEW 2.1 | £35(d) |
| VIEW 3.0 | £45(c) |
| Double View Disc | £15(d) |
| View Printer Driver | £9(d) |
| WORDWISE | £24(d) |
| WORDWISE PLUS | £38(d) |
| INTERWORD | £36(d) |
| SPELLMASTER | £42(d) |
| EDWORD II | £39(c) |
| WYSIWYG PLUS | £15(d) |
| *(What You See Is What You Get)* A screen and printer utility ROM | |

### DATABASE SYSTEMS

| | |
|---|---|
| Viewstore | £36(d) |
| Overview (for Master or Compact) | £65(b) |
| InterBase | £49(d) |
| STARdataBASE | £29(d) |

### SPREADSHEETS

| | |
|---|---|
| Viewsheet | £36(d) |
| Windomatic | £15(d) |
| (utility to release the power of Viewsheet) | |
| Intersheet | £37(d) |
| Interchart | £25(d) |

### LANGUAGES

| | |
|---|---|
| Acornsoft C | £29(d) |
| Acorn MicroProlog | £49(d) |
| ISO PASCAL | £51(c) |
| ISO PASCAL SAG | £30(d) |
| Oxford Pascal (B,B+) | £32(d) |
| Oxford Pascal (M) | £32(d) |
| Logotron Logo | £49(c) |

### NOVACAD (B,B+,M)

| | |
|---|---|
| NOVACAD T/M Version | £39(d) |
| NOVACAD + Plotter DG | £49(d) |
| Plotter Driver Generator | £12(d) |
| *TechnoCAD* | £99(c) |

### MARCONI TRACKER BALL

| | |
|---|---|
| RB2 Stand Alone | £49(c) |
| (Specify if AMX compatibility reqd) | |
| RB2 with Pointer Rom (M) | £59(c) |
| RB2 with Icon Master (B,B+) | £59(c) |

### UNIVERSAL DEVELOPMENT SYSTEM

A set of three packages to meet the needs of any software developer for assembling, disassembling and emulating codes for over 30 processors. Packages are structured to work with new processors.

| | |
|---|---|
| META Assembler | £90(b) |
| META Disassembler | £90(b) |

### COMMUNICATIONS

| | |
|---|---|
| Termulator (B, B+) | £25(d) |
| Termulator (M,C) | £35(d) |
| MAYA Terminal Emulator | £49(d) |
| (Disc with ROM Image (B,B+, M,C,A) | |
| MAYA Terminal Em. ROM | £7(d) |

### PRINTER UTILITIES

| | |
|---|---|
| Dumpmaster ROM | £26(d) |
| (screen dump utility for a variety of printers incl colour printers) | |
| Screen Print (a powerful printer dump utility) | |
| Black & White | £25(d) |
| Colour | £35(d) |
| *Please specify STAR or other* | |
| Printmaster | £24(d) |
| (Versatile utility for Epson printers) | |
| WYSIWYG plus | £15(d) |
| Printer drive for any printer, compatible with View, WW, Interword. On Screen display of the actual typestyles/fonts chosen. | |

### UPGRADES

| | |
|---|---|
| ADFS ROM | £26(d) |
| 1772 DFS Kit | £49(c) |
| DNFS ROM | £17(d) |
| 1770 DFS ROM | £15(d) |
| 1.2 OS ROM | £15(d) |
| BASIC II ROM | £22.50(d) |

### TIME WARP for Models B & B+

Upgrade your model B or B+ computer to provide real time and date information at any time. Time Warp with battery back up fitted as standard simply plugs into the User Port. Demo Software on Disc includes a diary/planner application. **£29(d)**

### SPARE PARTS

| | |
|---|---|
| BBC B/B+ Power Supply | £65(b) |
| BBC B keyboard | £52(b) |
| BBC B Keyboard Connector | £4.75(d) |
| BBC B/B+ Video ULA | £18(d) |
| BBC B/B+ Serial ULA | £12(d) |
| KeySwitch B,B+, M | £1.75(d) |
| (pse specify original type) | |
| UHF Modulator | £4(d) |
| 16Mhz Xtal | £2.50(d) |
| 17.734 MHz Xtal | £2.50(d) |
| 6502A | £5.50(d) |
| 4816 RAM (B) | £2(d) |
| Master psu | £59(b) |
| Master Keyboard | £62(b) |
| Keyboard Connector set (M) | £5(d) |
| 1Mb OS ROM M | £39(d) |
| CF30060 ULA (M) | £10(d) |
| CF30047 ULA | £15(d) |
| ULA (512) | £34(d) |
| ULA (6502 & Z80 2nd Proc) | £28(d) |
| Power Supply (2nd Proc) | £42(b) |
| ARC Keyboard Assy | £85(b) |
| Arc Power Supply | £65(b) |
| Mouse | £49(c) |
| Drive Cable | £5(d) |
| Keyboard Curly Cable | £22(c) |
| Window Moulding | £6(d) |
| 41464 | £8(d) |

*(If the parts you need are not listed above please call us)*

### MISCELLANEOUS

| | |
|---|---|
| Single Drive Case (no psu) | £10(d) |
| Dual Drive Case (inc cable/psu) | £42(b) |
| Plinth Case (inc cable/psu) | £95(d) |
| Drive Data Cable Single £5(d) Dual | £6(d) |
| Drive Power Cable Single £3(d) Dual | £4(d) |
| Econet Cable 5pin DIN/5 pin DIN | £3(d) |
| ROM Extraction Tool | £2(d) |

### EPROM ERASER

**UVI Eraser:** Compact eraser in smart case, can erase six eprom at a time. Safety cut out switch ensures no exposure to UV rays when the carrier tray is drawn out. **£47(c)**

**UVIT Easer:** As above but with a built-in timer so that you do not have to worry about over exposure and damaging the eproms. **£59(c)**

## BBC PUBLICATIONS EDUCATIONAL SOFTWARE

### PRIMARY EDUCATION

| | |
|---|---|
| Astronomy | £8(d) |
| Computers At Work Aud/Disc | £16(c) |
| Picture Craft | £17(d) |
| Introducing Geography | £15(d) |
| The Hall of Mirrors | £13(d) |
| Geordie Racer | £12(d) |
| Bird Spy | £8(d) |
| Maths Aud/Disc | £12(d) |

### SECONDARY LEARNING

| | |
|---|---|
| Technology & Design Pt 1 | £21.50(c) |
| Electric Fields | £8(d) |
| 'A' Level Statistics | £19(d) |
| 'A' Level Geography | £13(d) |
| Inside Information Prog/Cass | £10(d) |
| Book £8(d) Aud | £5(d) |
| Open Learning Pack D/Aud/Bk | £36(b) |
| Science Topic (ST): WAVES | £7(d) |
| ST: RELATIONSHIPS | £7(d) |
| ST: BONDING | £7(d) |
| ST: ElecMag. Spectrum | £7(d) |
| ST: Electronic in Action | £7(d) |
| ST: Newton & The Shuttle | £9(d) |
| ST: ECOLOGY | £9(d) |
| ST: POLYMERS | £9(d) |
| ST: Classif. & Periodic Tab | £10(d) |
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Codes: **Cass:** Program on Cassette. **Aud:** Audio Cassette. **Disc or no Code:** Program on disc
Above Programs are suitable for BBC B, B+ & Master

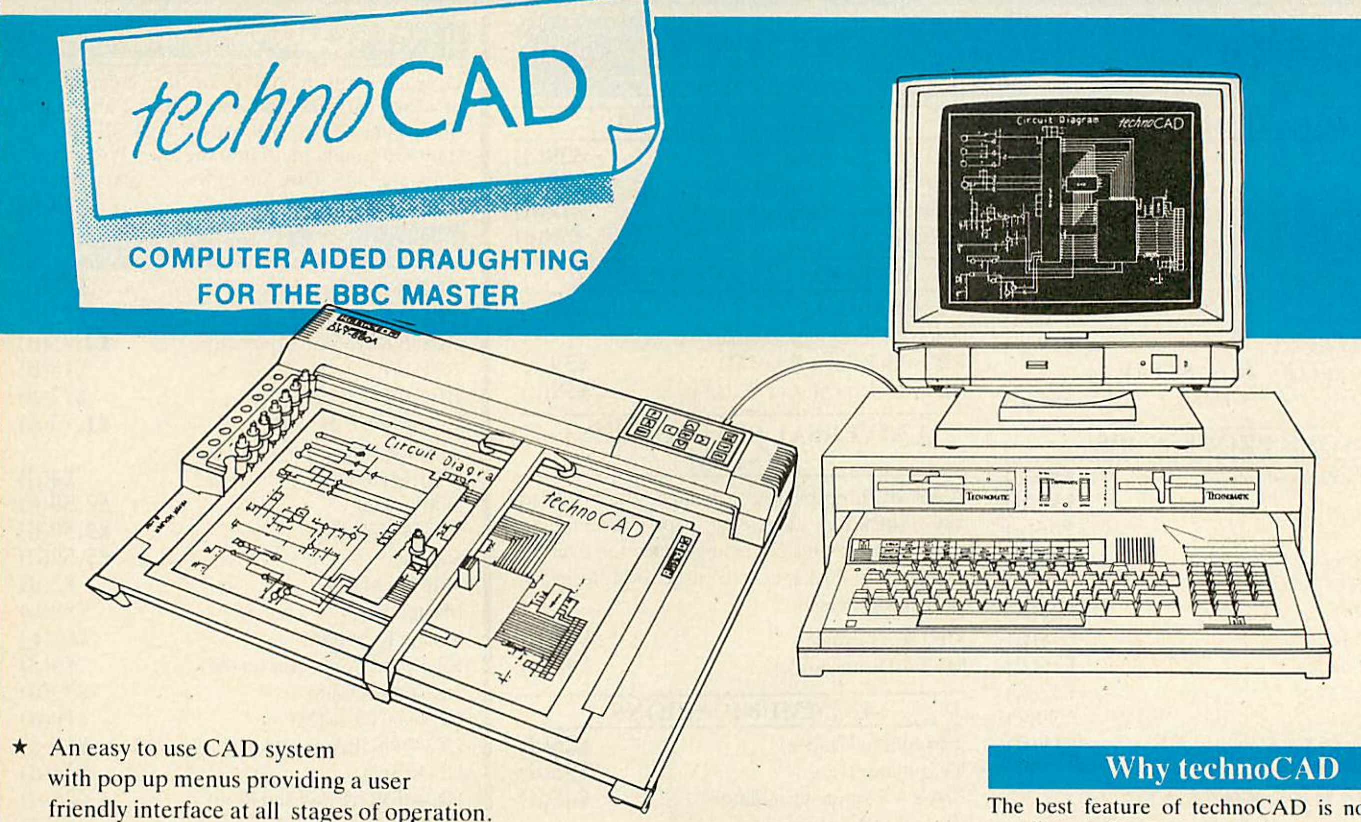
**All software in this advertisement has been tested to work with appropriate Acorn Disc Filing Systems only and we are unable to comment on compatibility with any other filing system. It will be the buyers responsibility to verify such compatibility.**



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# TECHNOMATIC

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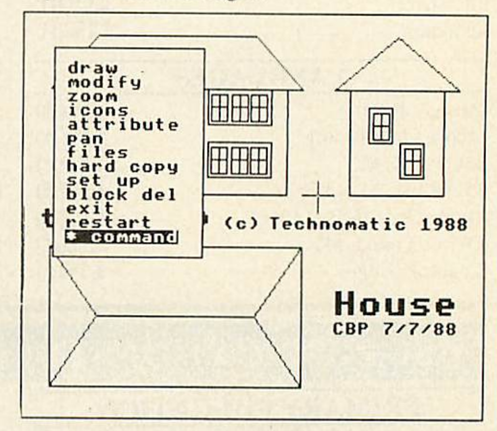



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- ★ Drawings can be scaled on screen to suit the plotter or printer in use. A maximum resolution of 0.01mm is available. Pre-configured drivers for many popular plotters and a driver generator for any BBC compatible plotter is included. Printer drivers for Epson 9 pin and 24 pin printers are included as standard as is the facility for installing drivers for other printers. Printers will output in landscape or portrait format.

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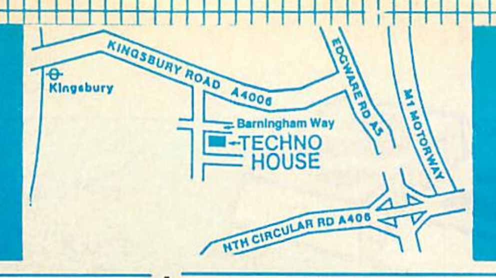
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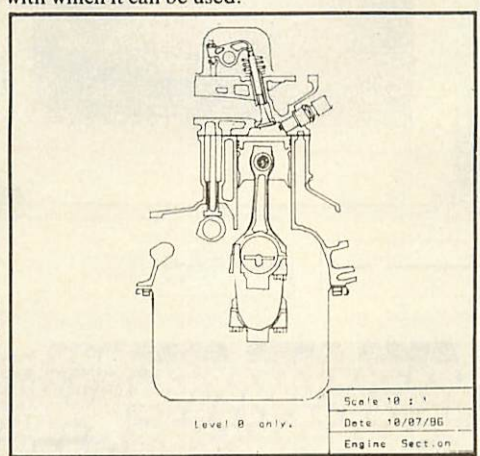
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Novacad is compatible with all models fitted with Acorn DFS. Hardware requirements can be minimum; single drive and FX80 compatible printer are enough to get started, though its performance is enhanced considerably by use of 6502 2nd processor, dual drive and to a degree with B+ and Master's shadow ram.

The major features offered are:

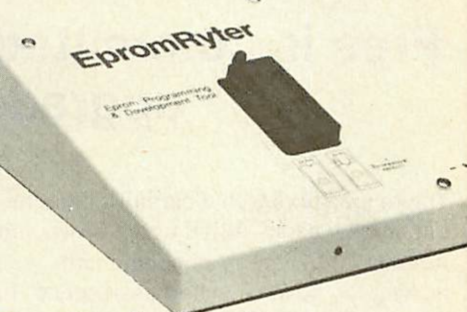
★ Simple and easy to use with logical command sequence.
★ A large drawing area (approx 15 screens)
★ Unique ability to create complex icons made up of upto 500 lines instead of the usual 15 to 20 pixels, store them in a library and recall them at different scales and orientations.
★ Zoom facility.
★ Create multi level drawings.
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★ Grid scaling and locking, displacement measurements.
★ Printer routine for FX80/100 compatible printers
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| NOVACAD T/M Version | **£49(d)** |
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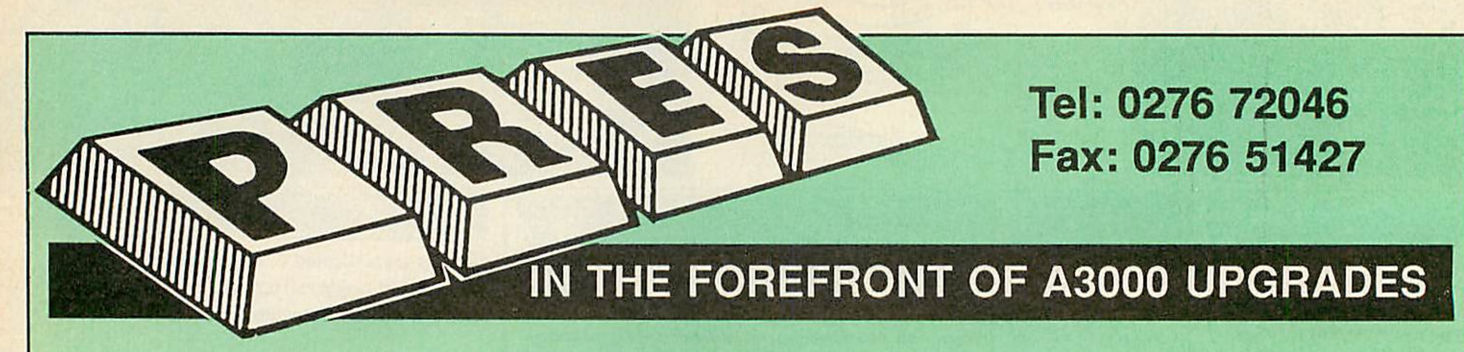
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# Pres is committed to providing a full range of compatible upgrades the the Archimedes A3000

The range starts with a carefully thought our monitor plinth 'A3K1' which allows the **A3000** to move freely back and forth making the most of limited desk space. In response from initial users we have also incorporated a way of preventing accidental access to the reset switch. Where security matters it is also possible to fix the plinth to a desk.
A3K1 is expandable to A3K2, a styled housing to take the **A3000** to a system. A3K2 is supplied with a post regulated, switch mode power supply and provides the means for adding up to 2 additional floppy drives (2 x 3.5" or 1 x 3.5" + 1 x 5.25") and a Winchester hard disc drive. All these can be added without having separate boxes hanging from the computer on ribbon cables.

PRES have also allowed for adding standard expansion cards (podules) on the rear of the machine. This is done by means of a casing which attaches and is fixed to the **A3000** case providing full protection for the expansion card. However it does not stop there. The case is expandable to take a backplane and expansion board which can accommodate FOUR mini cards. PRES will release the specification for the mini cards to any third party wishing to have their products on **A3000**. PRES are currently working on a range of Midi Cards, plans include . . . high spec analogue to digital converter, user ROM and battery backed RAM, SCSI, MIDI, 2nd. vdu.

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**£24.95**

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**£69.50**

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**£48.95**

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**£429.50**
**(includes hard disc controller card)**

The addition of a 5.25" disc drive is made possible with the Disc Buffer Board (A3K6). It fits inside the A3000 and still allows for the 1MHz bus and user port to be fitted, allowing for maximum internal expansion. A3K6 is supplied with On Board firmware for assigning drive numbers and 40/80 stepping.
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- 4 Podule backplane (Watford) £38
- Fan for the backplane £9
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| •Master Reference Manual I (No VAT) | £14 |
| Master Reference Manual II (No VAT) | £14 |
| Master Advance Ref Manual (No VAT) | £17 |
| 64K Upgrade Kit for B+ | £32 |
| Acorn 1772 DFS Kit complete | £49 |
| ECONET Upgrade Kit for BBC B | £42 |
| ALL ECONET UPGRADES Available | |
| ARIES' IEEE Interface for BBC B & Master | £238 |
| Morley Teletext Adaptor with ATS Rom | £99 |
| Filestore E01S £899 Filestore E40s | £799 |
| Filestore E60S £1080 Ecolink | £270 |

(Carr. £2 to £7 depending on the weight)

## Z88 Portable Micro




**Watford Electronics are the largest Z88 Dealer in the UK**

Only: **£195** (Carr £4)

**FREE**
With every Z88 purchased from us this month, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

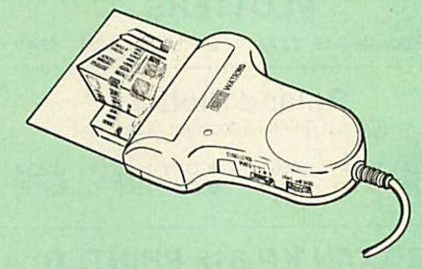
### ACCESSORIES

| | |
|---|---|
| 32K RAM Pack or 32K EPROM Pack | £17.35 |
| 128K RAM Pack or 128K ROM Pack | £43.40 |
| 512K RAM Pack | £169 |
| Z88 Eprom Eraser Unit | £34.75 |
| Z88 Pipedream Spellcheck (Colton) | £52 |
| Z88 Spellmaster for Pipedream | £51 |
| Z88 Carrying Case | £8.50 |
| Z88 Computing Book | £9.95 |
| AA Nicad Rechargeable Battery | £1.50 |
| Battery Charger Compact & Fast | £6 |
| Z88 Serial Printer Cable | £8.65 |
| Z88 Parallel Printer Cable | £24 |

| | | | |
|---|---|---|---|
| ● Z88 to BBC Link | £22 | ● Z BASE | £56 |
| ● Z88 to PC Link II | £30 | ● Z TAPE | £42 |
| ● Z88 to Macintosh | £49 | ● Z TERM | £42 |
| ● Z88 Mains Adaptor | £8.65 | ● Z88 Modem | £145 |

NEW

## Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system. The package includes the most comprehensive utility software available for the Archimedes, a high quality, ergonomically designed to fit the shape of your hand, (see drawing above) scanner, which is fitted with a warning LED that will indicate if the scanner is being moved too quickly for accurate results. Additional twin guide rollers ensure precise tracking over the image, to make the best use of the high resolution available with this sytem. The yellow/amber illumination of our Mk II scanner, enables you to achieve optimum accuracy.

### SCANNER

The scanner is capable of scanning up to an amazing 400 dots per inch (DPI)! The scanning area is 4" wide, and the height is only limited by the maximum amount of memory available. The dot resolution may be switched to 100, 200, 300 or the maximum 400 dpi. One of four operating modes may be selected offering either pure monochrome scanning, or one of three grey level modes. The grey level modes use different size dither patterns to represent up to 16 shades of grey. There is also a dial to allow the "brightness" to be adjusted over a wide range, in order to optimise the quality for any specific image. The scanner interface is a standard, single width, expansion card (podule) which plugs into the Archimedes' backplane. The socket on the rear panel connects the scanner by 1.8 metres of cable.

### SCANNER SOFTWARE

Full use is made of the windowing and the multitasking facilities of RiscOS. The software is supplied in a 64Kbyte ROM located on the interface board. The scanner appears as a small icon on the desktop icon bar, and the software is retrieved from the ROM simply by clicking on that icon. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. The other facilities included in the software are:

Cropping and scaling to any size including stretching and squashing in X and Y directions separately.

Colour tinting.

X and Y flip.

Edge detection which turns solid objects into outlines.

Selective directional copying whch allows features (i.e. lines or text) to be made thicker or thinner.

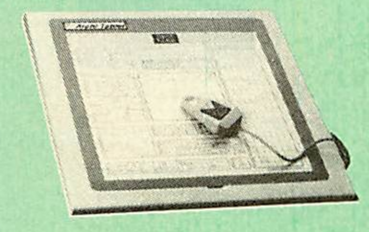
Scanned images may be saved as sprite files or transferred directly into other RiscOS applications (DTP, Draw, Paint) simply by dragging the sprite file into the application's window. Sprites may also be generated using anti-aliasing. This greatly improves picture quality and is particularly effective when scanning material with a range of grey tones, such as photographs. Images can be printed on any printer that is supported by a RiscOS printer driver, with optional settings for portrait or landscaped modes, image scale and positioning. Images are printed using the full resolution of the printer and are not limited to the screen resolution.

On-screen help is provided via the RiscOS interactive help facility. Calls are also provided in the ROM for users wishing to write their own software, incorporating the use of the scanner.

**Launch offer £149**
(P&P £4)

NEW

## Archi Graphic Tablet



This package allows Archimedes users to take advantage of the low cost graphpad (sometimes called a digitiser tablet, but not to be confused with a video digitiser!)

The Archi Graphpad offers performance and accuracy comparable to other graphics tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely.

The software, which is in the form of a relocatable module (RM), intercepts the system calls which control the mouse, and so allows virtually all mouse based Archimedes software to be controlled using the tablet without any modification. The only exceptions are programs which use the serial port, as the tablet is physically connected to this port itself.

Graphics programs such as Artisan, Pro Artisan, AutoSketch, Oak DTP, and the RiscOS Draw, Paint and DTP packages are considerably enhanced by the use of the graphics table as opposed to the mouse, although it can, of course, be used with any other mouse driven application.

The software allows the user to define how much of the tabler's 12" x 12" working area to use, allowing very fine control when drawing freehand or tracing from a variety of differently sized drawings, diagrams, photographs, etc.

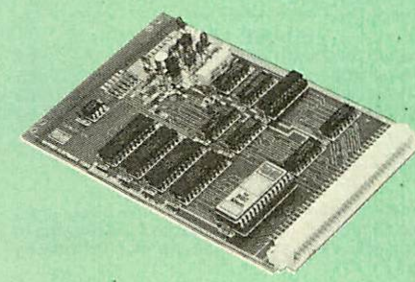
The tablet driver is compatible with all Archimedes machines, and with both Arthur and RiscOS operating systems.

The pointer is moved via a four button puck complete with transparent lens and crosshairs for optimum accuracy. Three of the buttons emulate the Archimedes mouse buttons precisely, the fourth being used for special functions such as setting the position and size of the active working area. The buttons may be remapped to allow the relationship between tablet and mouse buttons to be redefined, should this be required.

The software is supplied with a special adaptor lead to connect the tablet to the Archimedes' serial port, and a power lead which plugs onto the Archimedes' main board.

**Launch Price £259**
(Price includes Tablet, leads and software)
(P&P £4)

## Archimedes Real-Time Digitiser



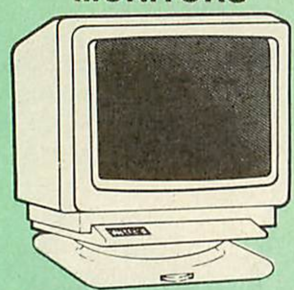
Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

**Price £249**

A Set of Colour Filters for colour image grabbing using a video camera **£16**

**Continued→ → → → → → → → →**

## MONITORS



### MICROVITEC 14"

- **1431** – Standard resolution as used on the BBC television computer programme £175
- **1451** – Medium resolution, suitable for word processing in mode 0 £219
- **1441** – High res, exceeds the capabilities of the BBC Micro £359
- **1431AP** RGB + PAL and AUDIO £199
- **1451AP** RGB + PAL and AUDIO £255
- **2030 CS** 20" Med Res £399
- **2040 CS** 20" Hi Res £675
- Dust Cover for Microvitecs £5.50
- **Touchtec 501 Touch Screen** £239

## 14" MULTISCAN COLOUR

- **TAXAN** Multisync 770 Plus £415
- **TAXAN** Multiscan 870 16" Monitor £575
- **TAXAN** Viking 19" Paper White, High Resolution (1152 x 896 with Archi 400 series) £799
- **EIZO** 8060H – For technical info. read the review in Micro User, Jan. '89 £429
- **EIZO** 9060S Super High resolution multiscan monitor for a wide range of applications. 800 dots x 600 lines. Display for high res VGA. 0.28 Dot pitch £469

## TAXAN 12"

- Super Vision 3 – **Type 625** Super Hi-res RGB Colour, Green/Colour Switch £269

## PHILIPS

- **BM7502** 12" Hi-res Green Monitor £64
- **BM7522** 12" Hi-res Amber Monitor £68
- **CM8833** 14" Med. Res Colour Monitor £195

## STAR BUY

- **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

**ONLY £189**

Dust Cover for Philips Monitors £6
**(Securicor carriage on Monitors £7)**

### SPARE LEADS

| | |
|---|---|
| **BNC Lead for Zenith or Philips** | £3 |
| Skart Monitor Lead | £5 |
| RGB lead for TAXAN Monitors | £3 |
| Archimedes Colour Monitor Lead | £7.50 |

## SWIVEL BASES

By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing at the top), you can easily adjust the monitor viewing angle.

for 12" Monitors **£8** (carr. £2.50)
for 14" Monitors **£12** (carr. £2.50)

## Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

**Price £12**

## CONCEPT KEYBOARDS

| | |
|---|---|
| Standard A3 for BBC | £135 |
| Standard A4 for BBC | £103 |

## PLOTTERS

- Plotmate A4S £379
- Plotmate A3M £549

## Roland Plotters

(Official Roland Appointed Distributor)

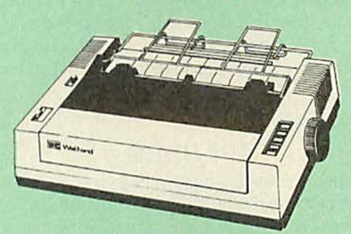
- DXY 880A £560
- DXY 1100 £630
- DXY 1200 £879
- DXY 1300 £1035

## TAXAN KP-815 PRINTER

### Offer Price £149

| | |
|---|---|
| RS232 Interface | £49 |
| RS232 Interface with 2K Buffer | £69 |
| RS232 Interface with 16K Buffer | £89 |

## Panasonic KX-P1081



*SALE OFFER only:* £135

***(Price includes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us)***

## KS-P1180 Printer Offer

Panasonic KX-P1180 printer, Dump Out 3, Screen Dump ROM & a BBC printer lead.

**Offer Price £146**

## Panasonic Printers

- **KX-P1124** 24pin 80col. 192/63 CPS £245
- **KX-P1180** 9pin 80col. 144/38 CPS £146
- **KX-P1540** 24pin 136col. 240/80 CPS £435
- **KX-P1592** 9pin 136col. 216/45 CPS £275
- **KX-P1595** 9pin 136col. 288/61 CPS £355

- **Panasonic KX-P4450** LASER PRINTER Latest technology at Watford's special offer price £1,349
- Spare Toner £29
- A4 Feeder £55
- Drum Unit £149
- Developer £115
- 1MB RAM Board £299

## Panasonic Accessories

### Cut Sheet Feeders

| | | | |
|---|---|---|---|
| KX-P1592/1595 (P32) | £175 | KX-P1540 (P35) | £185 |
| KX-P1124 (P36) | £88 | KX-P1180 (P37) | £79 |

### BUFFERS

| | |
|---|---|
| **P12** 4K buffer Board for 1081 | £55 |
| **P42** 32K buffer Chip for 1592/1595 | £25 |
| **P43** 32K Buffer Chip for 1540/1124 | £25 |

### Serial Interfaces

| | | | |
|---|---|---|---|
| P17 P1081/1592 | £32 | P19 P1124/1180 | £55 |

### Original Panasonic Ribbons

Guaranteed to last 3 million characters

| | |
|---|---|
| P110 for KX-P1081, 1592 & 1595 | £8 |
| P115 for KX-P1180 | £8 |
| P145 for KX-P1124 | £8 |
| P140 for KX-P1540 | £10 |
| Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red | £9.95 each |

## INTEGREX COLOUR JET

- Colour Jet 132 Printer £515
- Paper Roll £6.50
- Screen Dump Software £10
- Colour Cartridge £16.50
- Black Cartridge £10.35
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £123

NEW – Intergrex COLOURCEL NPQ Ink Jet Colour Printer £2,695

## NEC P2200 PINWRITER

24 pin; 80 column; 168CPS – 56CPS LQ; Epson LQ compatible, 7K Buffer; 7 resident FONTS, Friction & Tractor feed, front load single sheet feed, etc.

**£249**

| | |
|---|---|
| Pinwriter Serial Interface (optional) | £55 |
| P2200 Cut Sheet Feeder | £59 |
| Additional Font Cartridge | £25 |
| P2200 P2200 Spare Ribbon | £6 |
| P2200 Dust Cover | £5 |

## NEC PINWRITER P6/P7 Plus

| | | | |
|---|---|---|---|
| **NEC P6+** 80 columns | £439 | **NEC P7+** 136 columns | £575 |
| Colour Option | £74 | Serial Interface | £73 |
| Cut Sheet Feeder | £125 | | |
| NEC Ribbons for | | P6 £8; | P7 £9.50 |

Payment may be made by credit card, Connect card or cheque, but we also have available a range of finance terms, see the feature in our advert.

## Star Printers

| | | | |
|---|---|---|---|
| Star LC10 | £139 | LC10 Colour | £179 |
| Star LC24-10 | £205 | XB24-10 Colour | £425 |
| NB24-10 | £425 | | |
| LC10 Colour Ribbon | | | £6 |
| XB24-10 Colour Kit | | | £24 |
| Cut Sheet Feeder | | | £65 |

## EPSON PRINTERS

| | | | |
|---|---|---|---|
| EX800 | £410 | LQ850 | £405 |
| EX1000 | £564 | LQ550 | £259 |
| FX850 | £310 | LQ860 Colour | £539 |
| FX1000 | £425 | LQ1050 | £549 |
| FX1050 | £395 | LQ1060 | £679 |
| FX1060 | £679 | LQ2550+ | £895 |
| LQ550 | £245 | LX400 | £139 |
| GQ3500 Laser | £1150 | SQ2500 | £899 |

### CUT SHEET FEEDERS for

EX800 **£149**; FX800/LQ800 **£149**; FX850/LQ850 **£149**; FX1000/LQ1000 **£179**; LQ500/LX800 **£79**; LQ1050 **£175**; LQ2550 **£390**.

### TRACTOR FEED for

LQ800 **£44**; LQ850/FX850 **£69**; LQ1050/FX1050 **£85**; LQ2500 **£90**; LQ2550 **£90**.

### ACCESSORIES

- EX800/1000 Colour Option £55
- EX800/1000 Colour Ribbon £18
- LQ2500 Colour Option £65

**(Securicor Carriage on Printers £7)**

## EPSON PRINTER INTERFACES

All these interfaces fit inside the printer

| | | | |
|---|---|---|---|
| RS232 | £32 | RS232 + 2K Buffer | £52 |
| IEEE 488 | £40 | RS232 + 8K Buffer | £79 |

## PRINTER LEADS

| | |
|---|---|
| BBC Centronics 4' long | £5 |
| BBC Centronics 6' extra long | £7 |
| Compact's Special Centronics Lead | £7 |
| Archimedes Printer Lead 1 metre | £6 |
| Nimbus Centronics Lead | £12 |
| IBM Parallel Lead 1 metre | £6 |
| Double Ended 36 way Centronics Lead 4' | £7 |
| Double Ended 36 way Centronics Lead 6' | £9 |
| MSX Centronics Parallel Lead 4' | £12 |
| RS232 Leads (Various) | P.O.A. |

## Listing Paper (Perforated)

- 1,000 Sheets 9.5" x 11" Fanfold Paper £7
- 2,000 Sheets 9.5" x 11" Fanfold Paper £11
- 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold £19
- 1,000 Sheets 15" x 11" Fanfold Paper £9
- 1,000 Sheets true A4 Fanfold Paper 70gms £11
- 2,000 Sheets true A4 Fanfold Paper 70gms £19
- Teleprinter Roll (Econo paper) £4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

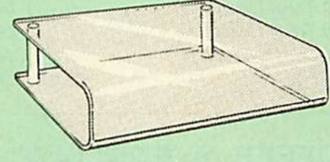
## PRINTER LABELS

**(On continuous fanfold backing sheet)**

| | |
|---|---|
| 1,000 90 x 36mm (Single Row) | £5.00 |
| 1,000 90 x 36mm (Twin Row) | £4.90 |
| 1,000 90 x 49mm (Twin Row) | £7.50 |
| 1,000 102 x 36mm (Twin Row) | £6.25 |

Carriage on 1,000 Labels £1.00

## Perspex Printer Stand



Give you Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand. The printer sits on top and the fanfold paper rests neatly underneath, thus occupying the same space as the printer footprint.

**80 Column version** £16 (carr £3)
**136 Column version** £20 (carr £4)

## Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and refold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

***80 Column version £23 (carr. £3)***
***132 Column version £26 (carr. £4)***

## PRINTER RIBBONS & VARIOUS DUST COVERS

| Type | Ribbons | Dust Covers |
|---|---|---|
| Brother HR15/20 | £3.00 | – |
| BBC Micro | – | £3.50 |
| BBC Master | – | £4.00 |
| Archimedes Micro pair | – | £9.00 |
| Citizen 120D | £3.95 | £4.50 |
| RX/FX80/MX80 | £3.00 | – |
| DMP2000 | £3.75 | £4.75 |
| EX/LQ800 | £4.50 | £4.50 |
| EX/LQ1000 | £7.50 | £5.00 |
| RX/FX80/85/800/MX80 | £3.90 | – |
| RX/FX100/1000 | £5.75 | – |
| Kaga/Taxan KP810/815 | £4.90 | £5.00 |
| LC10 (Black) | £4.25 | £5.00 |
| LQ500/800 | £3.75 | £5.00 |
| LQ1050/LQ2500 | £8.50 | £5.50 |
| LX80/86/800 | £3.80 | £4.50 |
| M1009/GLP | £3.80 | £3.75 |
| Panasonic KX1080/81 | £4.00 | £4.75 |
| SQ2500 | £23.00 | £5.50 |
| Star NL10 | £3.75 | £4.50 |
| Olivetti Ink Jet Cartridges (set of 4) | £9 | |

Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

## Universal Printer Sharers/Changer

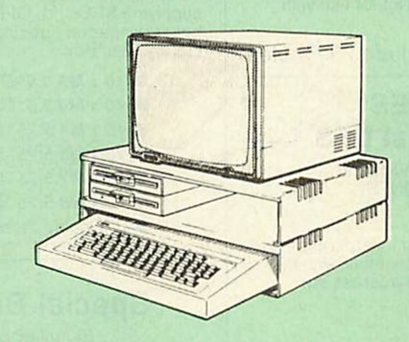
Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

**(Ideal for School environments)**

| Connects | Serial | Centronics | P&P |
|---|---|---|---|
| 2 to 1 | £20 | £22 | £3 |
| 3 to 1 | £27 | £30 | £3 |
| 5 to 1 | £36 | £39 | £4 |

(Cables extra at £6 each. Please specify type required when ordering)

## PLINTHS FOR BBC MICRO, MASTER & PRINTERS



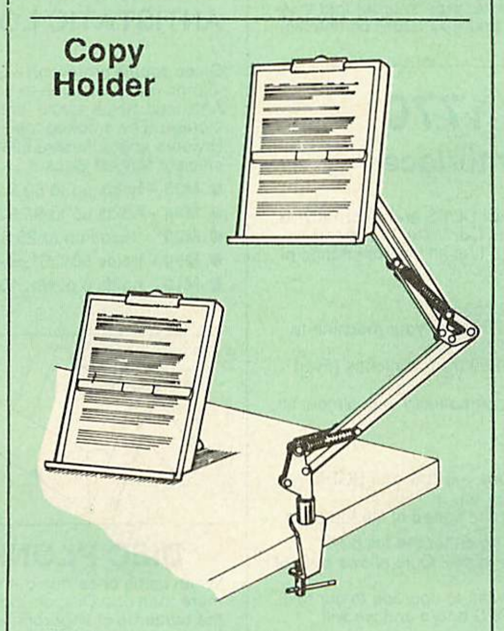
Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

| | | |
|---|---|---|
| Single BBC Plinth | 420 x 310 x 105mm | **£13** |
| Double BBC Plinth | 420 x 310 x 210mm | **£24** |
| Printer Plinth | 420 x 310 x 105mm | **£12** |
| Single Master Plinth | 490 x 310 x 105mm | **£14** |
| Double Master Plinth | 490 x 310 x 210mm | **£26** |

(Carr. Single plinth £2; double plinth £3)

## Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding you paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)
Angle poise **£12** (carr. £3)

NEW

## Handy 2 Way Printer Switch

A handy two way compact printer switch that enables you to connect 2 Micros to 1 printer, or 2 printers to 1 Micro. Attaches easily to your printer, monitor, etc. A low cost solution for educational establishments. Ideal for those wishing to use a dot matrix and a laser printer. Available in two configurations.

| | |
|---|---|
| Compact AB Switch Centronics | **£20** |
| Compact AB Switch RS232 | **£19** |

(Cables extra at £6 each)

## MEGABUFFER 256



The Smallest 256K Printer Buffer Unit in the world
**38mm x 130mm x 134mm.**

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatiblity with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in text unit for both the buffer & your printer.

**Only £149** (carr £5)

## THE EPSON RX-FX-KAGA PRINTER COMMANDS. REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you are with all sorts of printouts to show its capabilites – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

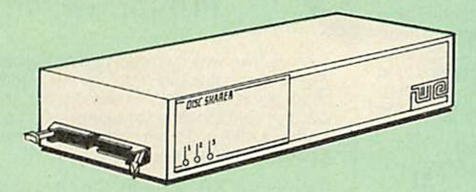
**£5.95** (No VAT)




**CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383**

Continued→ → → → → → → → →

# DISC DRIVE SHARER




## (Ideal for educational establishments)

At last, a low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price : £65 Price includes 3 Cables

## NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

If you already have the Watford Electronics DFS and wish to incorporate these new facilities then simply return your existing DFS ROM to us together with £5 remittance for an upgrade. Please pack the ROM securely and address the package to our Upgrades Dept.

## WATFORD's & ACORN's DFSs

*Watford's popular and widely acclaimed DFS has now been available for six years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade.* ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn standard DFS), (while Acorn's 1770 DFS is fully compatible with Watford's Mk II DDFS)***

- *Watford's sophisticated DFS ROM only* £16
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* £12
- *DFS Manual (Comprehensive)* *(no VAT)* £6.95

*(P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs)*

- *DNFS ROM only* £17 • *ADFS ROM only £25*

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).




# Watford's MkII 1770
## Double Density DFS Interface

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only £30.00.

- SPECIAL PRICE £44.00
- DDFS Manual (No VAT) £6.95
- We will exchange your existing DFS Kit for our sophisticated DDFS for only £25.00

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

## DUST COVERS (For our Disc Drives)

Single CLS (without PSU) £3.20 Twin CLD (without PSU) £3.85
Single CS (with PSU) £3.25 Twin CD (with PSU) £3.90

# 3M – DISKETTES

*3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor*

- *10 x 5.25" S/S D/D 40 Track Diskettes (744)* £6
- *10 x 5.25" D/S D/D 40 Track Diskettes (745)* £7
- *10 x 5.25" S/S D/D 80 Track Diskettes (746)* £9
- *10 x 5.25" D/S D/D 80 Track Diskettes (747)* £9
- *10 x 5.25" 1.6M D/S D/D High Density Discs for IBM XT and AT* £14
- *10 x 3.25" S/S D/D 40/80 Track Discs* £10
- *10 x 3.25" S/S D/D 40/80 Track Discs* £11
- *10 x 3.5" High Density Diskettes* £25

## TOP QUALITY 3.5" & 5.25" DISKETTES

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

- *10 x M3 3.5" D/S D/D 80 Track Discs* £10
- *10 x M9 3.5" Double Side High Density* £25
- *10 x M4 5.25" S/S D/D 40 Track Discs* £5
- *10 x M5 5.25" D/S D/D 40 Track Discs* £7
- *10 x M7 5.25" D/S D/D 80 Track Discs* £9
- *10 x M8 5.25" D/S H/D Hi-Density Discs* £14
- *3" Double Sided Discs* £2.50 each

## Special BULK OFFER on 5.25" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)




### BULK PACK DISCS in lots of 100

| Type | S-S 40T | D-S 40T | D-S 80T |
|---|---|---|---|
| • Without Sleeves | £30 | £35 | £40 |
| • With Sleeves | £33 | £38 | £43 |

## FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

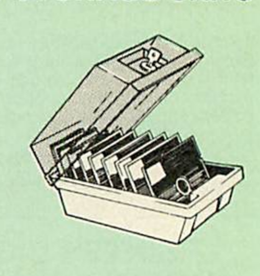
Price £4

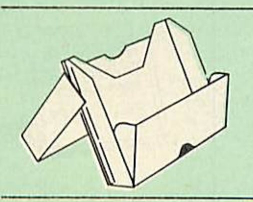
## ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

- M35 – holds up to 50 5.25" discs £4.95
- M85 – holds up to 95 5.25" discs £6.95
- M25* – holds up to 25 3.5" discs £4.95
- M50 – holds 50 3.5" discs £6.50
- M10 – holds 8 of No. 10 Data Cartridges £15

* Not lockable





## PLASTIC LIBRARY CASES

Holds up to 10 5.25" Discs. **Only £2.00**

## DISC PLONKER RACK

When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the harzards of fingerprints, scratches, dust, coffee and an untidy desk.
Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: £2



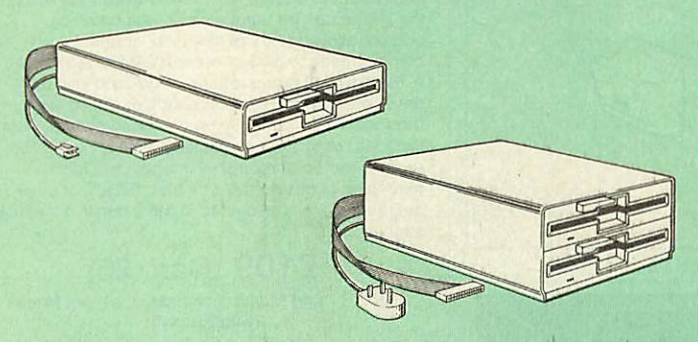
## DISC ALBUMS

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket. £4

## Quality Disc Drives from Watford

*To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.*
*This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with an Utilities Disc.*
*The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.*
***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*
*Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public. If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.*
*Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. **Ideal for Schools & Colleges.** We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £18. (At Watford we anticipate your needs of tomorrow, not just today!)*
*When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 4th page of our advert for the Plinths).*
*P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.*

### Our Disc Drives conform to BS415



### "Test Bureau Approved for Use in Education"

| Capacity | Drives without P.S.U. | | Drives with P.S.U. | |
|---|---|---|---|---|
| | Single | Twin | Single | Twin |
| 400K (720K) | CLS400S £75 | CLD400 £168 | CS 400S £85 | CD400 £188 |
| 800K (1,44M | | CLD 800S £153 | | CD 800S £163 |

● TWIN Disc Drive Case, complete with Power Supply & Cables £43
**Securicor carriage on Disc Drives £6 to £7**

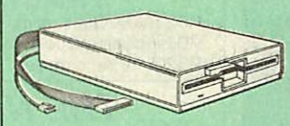
*Prefix* *C = Cased Drive*
*L = Less PSU*
*S = Single*
*D = Double*

*Suffix* *S = 40-80 Switchable*

*e.g.* *CLS400S = Cased Disc Drive, Less power supply unit, single 5.25" 400K, (720K in double density); Double sided; 40/80 track switchable.*

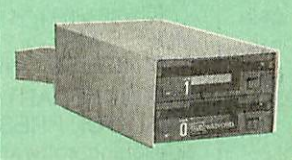
**Cable to connect 5.25" Disc Drives to BBC Compact**
**Single £9 Twin £12**
**Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13**

## Special 40/80 Disc Drive/DDFS Mk II Offer



- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both Single & Double Density modes.
- A comprehensive User Friendly Manual.

A Bargain at Only **£119** (£7 carr) (Offer valid while stocks last)



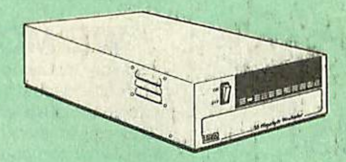
## 3.5" DISC DRIVE OFFER

These top quality 3.5" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

*Drives to connect to BBC Micros own PSU*
- **CLS35 400K Unit £69**
- **CLD35 Twin 800K £125**

*Drives with built-in Power Supply Unit*
- **CS35 Single 400K £85**
- **CD35 Twin 800K £135**

(P.S. CS35 Single is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage).

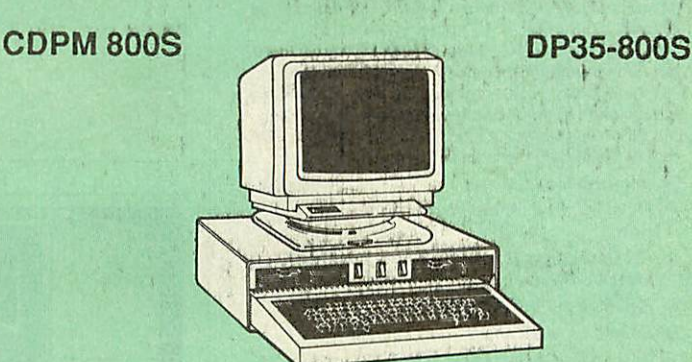


## WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.
This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a Utilities Disc.
Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!
Compatible with the Master, and the BBC B (with 17 X disc interface).

● 30 Megabyte BBC Hard Disc **£369** (carr £9)

## CDPM 800S DP35-800S



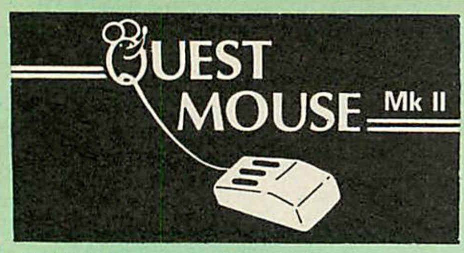
Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

**CDPM 800S for the BBC B & Master £179**

A Double disc drive with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master series is the 5.25" disk, the standard of the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.
To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S. It contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.
The 5.25" disc drive is 40/80 track switchable. DP35-800S has its own power supply, independent of the BBC Micro.

**DP35-800S for BBC/Master £165**
*(Securicor Carr. £7)*
(The above drive units are 2 Megabytes unformatted)

Continued→ → → → → → → → →




- Quest Mouse II & Quest Paint £58
- Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont £89
- Quest Mouse II only £29
- Quest Paint Software only £34
- Quest Font Disc £15
- Quest Mouse Mat (Red or Blue or Green please specify) £3
- Part Exchange your unreliable AMX Mouse for a Quest Mouse for only £22
- GXR ROM for the BBC Micro £22 (P.S. Quest Paint is not compatible with BBC Compact)

N.B.
1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.




Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced and powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

**ConQuest ROM Package** £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)




## ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £39

## RB2 Marconi TRACKER BALL

| | |
|---|---|
| RB2 (AMX/Quest compatible) | £45 |
| RB2 including Quest Paint | £75 |
| RB2-A for Archimedes | £52 |

## *THE NEW Mk III AMX MOUSE*

**Inc. Super Art package**

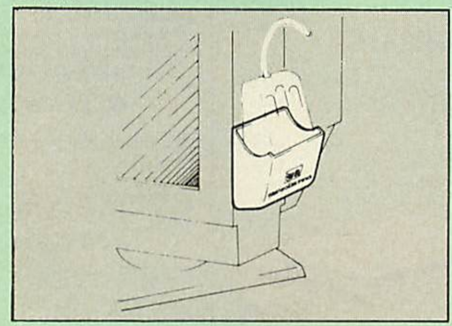
**ONLY: £59** (carr £3)

*(Please specify for BBC, Master or Compact)*

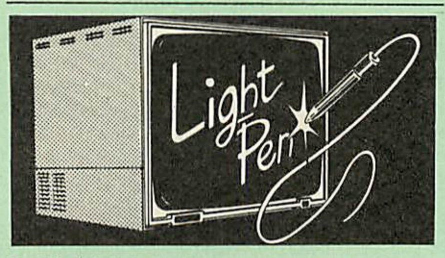
| | |
|---|---|
| MOUSE MAT | £3 |
| AMX MOUSE ONLY | £29 |
| AMX SUPERART Package | £34 |
| AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse | £32 |
| PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker | £13 |
| AMX DESIGN (ROM) | £55 |
| AMX XAM Educational | £15 |
| AMX EXTRA EXTRA | £16 |
| AMX MAX A gem of desktop (ROM) | £20 |

## WE MOUSE HOUSE

Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk. It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.



**Price £4**



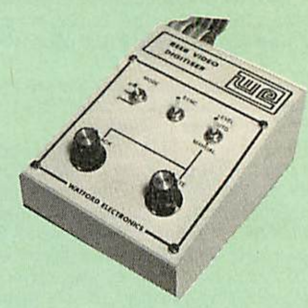

Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

**Only £21**

## FLEET STREET EDITOR

| | |
|---|---|
| Software pack for BBC Micro | £33 |
| Software pack for the Master | £39 |
| Admin Xtra Disc Utility | £13 |
| Walt Disney Disc Utility | £13 |
| Fonts N Graphics Disc Utility | £13 |

## *BEEB* VIDEO DIGITISER



**"Test Bureau Approved for Use in Education"**

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.
This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.
Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.
Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.
Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional ★ commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.
A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image. Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

**£109** (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)

**(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)**

## *Magazine Maker*

**(As seen on TV)**

A combination of Stop Press and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Stop Press to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Stop Press's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Stop Press's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in Wordwise and View files plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00** (carr. £3)




## The WAPPING EDITOR

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

## PAGE LAYOUT SECTION

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module is a mode 0 version of the highly acclaimed Quest Paint package, detailed elsewhere in our advert, and incorporates all the same drawing facilities, e.g. pencil, brush, airbrush, polygon, circle, ellipse, fill, cut-and-paste, etc., etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

## WORD-PROCESSOR

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

## THE FONT EDITOR

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individully proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.

Upgrading to the Wapping Editor could not be easier since the font editor will convert fonts from other packages, such as Quest Paint or Stop Press (formerly Pagemaker), into Wapping Editor format and a mode conversion utility will convert any screen in modes 1, 2, 4 or 5 into a full grey-scale mode 0 screen. Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser, either independantly or from within the Wapping Editor package.

For convenience all types of file may be stored on the same disc, with the software intelligently and transparently distinguishing between them. Filenames are picked off the screen with the mouse, dispensing with keyboard entry wherever possible.

"The Wapping Editor combines sophistication with ease of use and power with simplicity, to make it the most comprehensive and user-friendly DTP system ever likely to be written for the Beeb".

| | |
|---|---|
| Wapping Editor Software Pack | £69 |
| Wapping Editor plus Mouse | £89 |

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

NEW

## Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

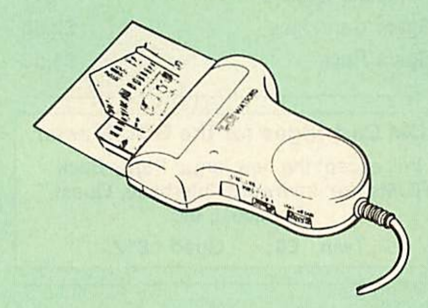
Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

## The Beeb HandScan
### Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware £135

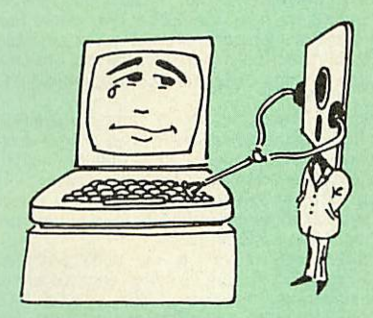
NEW

## Wapping Font Disc

Sixteen Wapping Editor fonts including smaller versions of Oberon and Daisy and two new sizes of the standard font.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12

## DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

**Only £20.00**

(Only suitable for BBC B with 8271 DFS)

Payment may be made by credit card, Connect card or cheque, but we also have available a range of finance terms see the feature in our advert.

NEW

## Beeb DOS 2.2

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual.

**Price: £39**

(Please write in for technical literature)

Continued→ → → → → → → → → →



# ARIES CORNER

## B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as th printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC m...o – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£69** (carr. £2)

## Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

| Price: | | |
|---|---|---|
| | Aries B-12 | £36 |
| | Aries B-12C | £5 |

## ARIES B-488 IEEE-488 INTERFACE UNIT

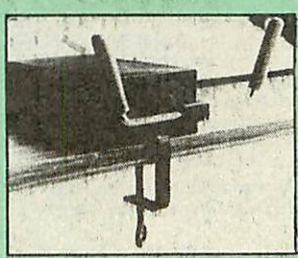
The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

**£238** (Carr £3)

## VOLTMACE JOYSTICKS

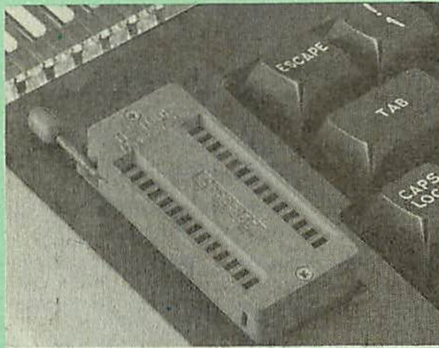
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|---|---|
| **Delta 3B Single Joystick** | £10 |
| Delta 3B Twin Joysticks | £15 |
| Delta 3C Joystick for Compact | £10 |
| Delta 14B Single Joystick | £11 |
| Delta 14B/1 Adaptor Module | £12 |
| Transfer Software Disc-Tape | £7 |
| Delta-Cat A mouse eliminator Joystick for the Archimedes | £26 |

### Delta Base B



| | |
|---|---|
| Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 | £25 |

## SIDEWAYS ZIF SOCKET




Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£18** (carr £3)

## Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

| | |
|---|---|
| ● Complete System | £11 |
| ● Spare Cartridges | £2.50 |
| ● Spare Rack | £1.50 |

**ROM Cartridges for the BBC Master**

Will accept the new larger Plggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£8**; Quad **£12**

## 16K DISC RAM

**(16K Sideways RAM Module)**

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.

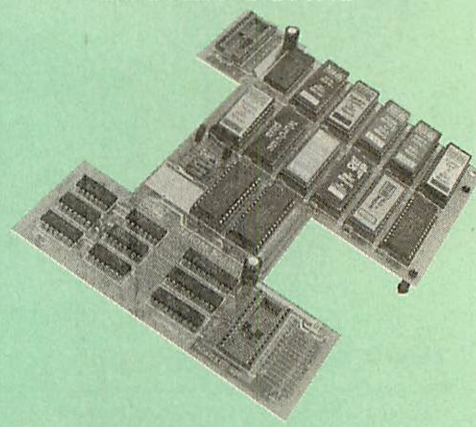
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- Supplied complete with Battery Backup.
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£32** (carr £2)

P.S. 16K Disc Ram Board is not designed to work in conjunction with a Sideways ROM Board.

## SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

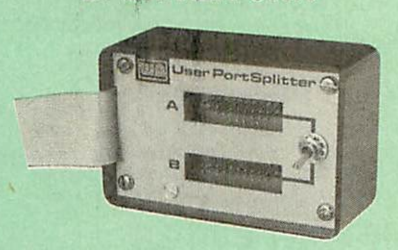
- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

**Price: Only £35**
Battery Backup fitted **£39**
Battery Backup only **£3**
16 Sideways RAM **£9**
(carriage £2)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

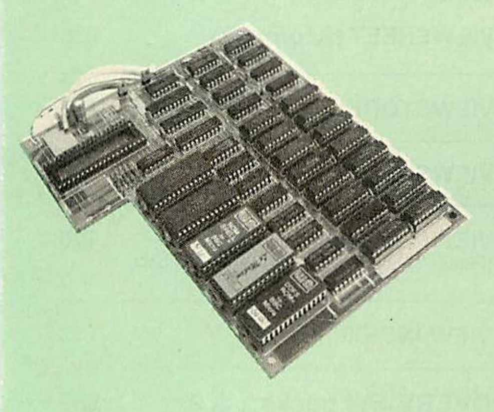
## USER PORT SPLITTER UNIT




Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

# ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 6 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

### *INTRODUCTORY PRICES:*

- ROM/RAM card with 32k dynamic RAM ........ £48
- ROM/RAM card with 64k dynamic RAM ........ £65
- ROM/RAM card with a massive 128k dynamic RAM ........ £109

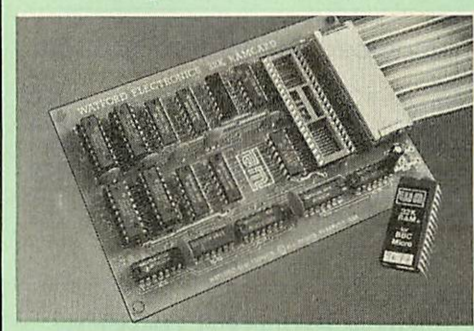
(carriage on ROM-RAM Card £3)

### *OPTIONAL EXTRAS:*

- 16k plug-in Static RAM kit ........ £9
- 16k Dynamic RAM for Upgrade ........ £13
- Battery backup ........ £3
- Read and Write protect switches ........ £2 each
Complete ROM-RAM board
All options installed ........ £115

P.S.
**IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.**

# 32K SHADOW RAM-Printer Buffer
## Expansion Board




A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.

- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

**Only £59** (carr £2)
(Price includes a comprehensive manual and the ROM)

## INCREDIBLE WORDPROCESSING DEAL

Watford's 32k SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (Carr £2)

**CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383**

Payment may be made by credit card, Connect card or cheque, but we also have available a range of finance terms. See the feature in our advert.

## BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs £11.25
- Maths with a Story 2 (Disc). 4 further maths programs. £11.25
- Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs. £17.00
- RELATIONSHIP: Science (Disc) O-Level Biology program. £20.00
- BONDING: Science (Disc) O-Level Chemistry program. £20.00
- ELECTROMAGNETIC SPECTRUM (8 Discs) O-Level program. £20.00
- ELECTRONICS IN ACTION (Disc) O-Level program. £19.95
- NEWTON & THE SPACE SHUTTLE (Disc) O-Level program. £20.00
- ECOLOGY (Disc) O-Level program. £20.00
- POLYMERS (Disc) O-Level program. £20.00
- Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. £20.00
- FOOD & POPULATION (Disc) O-Level program. £20.00
- MICROTECHNOLOGY (Cassette) O-Level program. £11.25
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. £21.70
- DEUTSCH DIREKT! (Disc & Audio Cassette) £19.95
- Modem Master (Disc) £11.25
- ADVANCED TELETEXT SYSTEM £8.65
- PERIOD TABLE SOFTWARE £20.00
- Astronomy – Primary (Disc) £12.00
- Computers at Work – Primary £17.35
- Introducing Geography – Primary £17.00
- Introducing Geography 11-17 years £17.50
- Electric Fields 6-14 years £11.25
- Black Queen Contract Bridge £13.00
- Espana Viva – 3 Discs £19.95
- A Vous La France Disc £21.50

## Educational Software

**FUN SCHOOL 2 – Red:**
Under 6 yrs – 8 programs on Discs, Shape Snap, Find the Mole, Teddy Count, Write a letter, Colour Train, Pick a Letter, Spell a Word & Teddy Bears Picnic.

**FUN SCHOOL 2 – Green:**
6-8 yrs – Eight programs on Disc, Number Train, Shopping, Maths Maze, Treasure Hunt, Bounce, Packing Caterpillar, 3 Number jump £11.00

**FUN SCHOOL 2 – Blue:**
Over 8 yrs – Eight programs on Disc, Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape. £11.25

## Versatile BEEB SPEECH SYNTHESISER Unit




The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

**SPECIAL PRICE £32** (carr £2)

Continued→ → → → → → → → → →

## COMPUTER CONCEPT'S ROMS

| | |
|---|---|
| ACCELERATOR | £30 |
| CARETAKER Basic Utility | £23 |
| DISC DOCTOR | £28 |
| Graphics ROM | £29 |
| TERMI | £25 |
| COMMUNICATOR | £49 |

**Wordwise** £26

**Wordwise plus** £40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

## Word-Aid

**The most comprehensive utilities ROM for Wordwise-Plus**

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

**HI-WORDWISE-PLUS DISC:** £5

**SPELL MASTER** £42

**Inter SHEET** ONLY £37




ONLY: £25

**Inter-WORD** £36

## MEGA-3 ROM

Interword, Intersheet & Interchart – 3 in one ROM £76

**INTERBASE £49**

All Prices Exclusive of VAT

## MINI OFFICE II

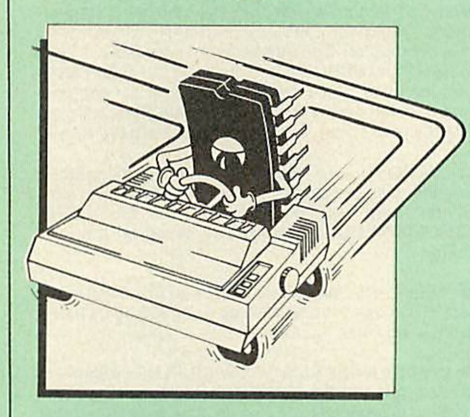
| | |
|---|---|
| DISC Version for BBC B & B+ | £14.00 |
| DISC Version for BBC Master | £16.50 |
| DISC Version for the Compact | £18.00 |

(When ordering please specify for which Micro & 40 or 80 track Disc)

## Advanced Computer Products

| | |
|---|---|
| Advanced Disc Toolkit | £30 |
| Advanced Disc Investigator | £25 |
| Advanced 1770 DFS BBC | £29 |
| Advanced 1770 DFS Master | £30 |
| Advanced File Manager | £25 |
| Advanced Control Panel | £30 |

## VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing at only a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

**Price: Only £33**

| | |
|---|---|
| **VIEW 3.0 ROM** | **£48** |
| **VIEW PROFESSIONAL** | **£59** |
| **VIEWSHEET (Acornsoft)** | £36 |
| **VIEWSTORE** | £36 |
| **VIEWSPELL with 80 track disc** | £29 |
| **VIEWPLOT Disc** (Please specify for Master 128 or Compact) | £20 |
| **VIEW-INDEX** | £12 |
| **OVERVIEW packs 1 & 2** | £69 |

**Watford's own Sophisticated VIEW PRINTER DRIVERS**

| | |
|---|---|
| Epson FX80 & Kaga KP (Disc) | £8 |
| Juki & Brother HR15 (Disc) | £8 |
| Silver Reed Printers (Disc) | £8 |

## *OFFICE MASTER*



**CASHBOOK** – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.

**FINAL ACCOUNTS** – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

**MAILIST** – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

**EASILEDGER** – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

**INVOICES & STATEMENTS** – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

**STOCK CONTROL** – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

## *OFFICE MATE*



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

**DATABASE** – Set up a computerised card index system with powerful search facilities.

**SPREADSHEET** – Offers many calculation and editing features

**BEEBPLOT** – Provides visual representation from Spreadsheet data.

**OFFICE MATE Only £10** (Disc)

## BOOKS (No VAT on Books)

| | |
|---|---|
| 15 Hr Wordprocessing BBC/View | £5.95 |
| 15 Hr Wordprocessing BBC/WW & WW+ | £5.95 |
| 30 Hour BASIC (BBC Micro) | £12.95 |
| 6502 Assembly Language Programming | £19.95 |
| 6502 Application | £13.95 |
| 6502 Development Package | £7.50 |
| 6502 Programming the | £16.95 |
| 6502 Reference Guide | £10.95 |
| 68000 Assembly Language | £15.95 |
| 68000 Assembly Language Prog. | £19.95 |
| 68000 Assembly Language Techniques | £24.95 |
| 68000 Machine Code Programming | £13.00 |
| 68000 Microprocessor Handbook | £14.95 |
| 68000 Programming the | £22.95 |
| 68000 User Guide | £8.95 |
| 6809 Pogramming the | £18.95 |
| **Advanced User Guide for BBC** | **£10.95** |
| Amiga Machine Lang. Guide | £19.95 |
| Art of Microcomuter Graphics | £16.95 |
| Assembly Language Prog. for the BBC | £10.95 |
| Assembly Language Quick Ref. | £21.95 |
| AY-3-8910 Programmable Sound Generator Data Manual | £3 |
| BASIC 2 – User Guide | £2 |
| Basic V – A Dabhand Guide | £9.95 |
| BBC – Advanced Graphics with the | £11.75 |
| BBC Basic Guide | £19.95 |
| BBC BASIC – Mathematical Programs | £8.95 |
| **BBC Computer Handbook – The Complete** | **£14.95** |
| BBC – Mastering Assembly Code | £8.95 |
| BBC Micro & the small Business | £5.75 |
| BBC Micro – File Handling On | £8.50 |
| BBC Micro – Within the | £13.95 |
| BCPL User Guide | £14 |
| BCPL The Language & its Compiler | £8.50 |
| C Big Red Book of | £7.50 |
| C – A Dabhand Guide to | £14.95 |
| C for Programmers | £9.95 |
| C Programming Lang. 2nd Edition | £24.95 |
| COMAL – Introduction to | £9.50 |
| Complete FORTH | £6.95 |
| Deutsch Direkt! (Book only) | £5.95 |
| DNFS Instruction Booklet | £2 |
| **DISC FILING SYSTEM (DFS) Operating Manual for BBC** | £6.95 |
| File Handling on BBC Micro | £8.50 |
| FORTH – Advanced | £9.95 |
| FORTH on the BBC Micro | £9.95 |
| Hackers Handbook – New | £6.95 |
| Hitch-Hikers Guide to A.I. | £8.95 |
| Introduction to COMAL | £9.50 |
| Inside Information, Computers & Coms. | £9.95 |
| ISO-PASCAL Reference Manual | £9.95 |
| LISP the Language of Artificial Intelligence | £13.95 |
| Logo on the BBC Micro | £7.50 |
| **Mysteries of DISC DRIVES and DFS REVEALED** | **£5.95** |
| Mastering Assembly Code | £8.95 |
| Mastering Interpreters & Compilers | £14.95 |
| Mastering Music | £6.95 |
| Mastering the Disc Drive | £7.95 |
| Master 512 Guide – Dabs | £9.95 |
| Master Operating System | £12.95 |
| Master Reference Manual Part 1 | £14 |
| Master Reference Manual Part 2 | £14 |
| Master Reference Manual – Advanced | £19 |
| MINI OFFICE II – A Dabhand Guide | £9.95 |
| PASCAL – Introduction to | £17.95 |
| PASCAL on the BBC Micro | £9.95 |
| PASCAL Programming | £9.95 |
| Practical Disc File Techniques | £5.95 |
| **The Epson FX-KAGA PRINTER Commands REVEALED** | **£5.95** |
| The Software Business | £5.50 |
| Towers Int. Transistor Selectors | £14.95 |
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| View Guide (View 2.1) | £4.50 |
| Viewsheet & Viewstore Dabhand Guide | £12.95 |
| Mastering View, Viewsheet & Viewstore | £12.95 |
| VIEW Dabhand Guide | £12.95 |
| Viewsheet User Guide | £10 |
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| Amstrad Technical Manual for 1640 | £19.95 |
| Amstrad PC Programmers Ref Guide | £7.50 |
| Amstrad PC1512-1640 Step by Step – Using | £8.50 |
| Amstrad PC 1512/1640 – Using 2nd Ed. | £9.95 |
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| Autocad – Using Release 10 | £26.95 |
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| dBase II – Working with | £9.95 |
| dBase III – Mastering | £21.95 |
| dBase III Plus | £12.95 |
| dBase III Plus – Complete Reference | £19.95 |
| dBase III Plus – Mastering | £21.95 |
| dBase III Plus Handbook 2nd Edition | £20.95 |
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| dBase III Plus – Quick Prog. Guide | £8.95 |
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| dBase 4 – Understanding | £22.95 |
| DOS Instant Reference (up to 3.3) | £10.95 |
| DOS, Mastering for Versions up to 3.3 | £22.95 |
| DOS Power Tools (includes a disk) | £39.95 |
| DOS Plus Manual/Amstrad PC | £9.95 |
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## The Advanced Reference Manual for the BBC Master

At last Acorn's long awaited Advance Reference Manual for the BBC Master Series of Microcomputers has now been published. Watford Electronics' own authors have edited and added missing sections to the original script and produced a very high quality publication.

It features information about:

- Memory Organisation
- Slow data bus
- Detailed circuit description
- Keyboard controller
- Screen display
- User port
- Serial processor
- Peripheral bus controller
- 1 Mhz Bus
- Machine operating system
- Second processors – Internal, Z80 and 80186
- Disc Filing Systems
- ANFS
- Terminal Emulator & Editor
- View internal format
- Detailed differences between Model B, B+, Master 128K and Compact
- Comprehensive appendix on 65C12 instruction set

At the rear of the manual there are pull out circuit diagrams for the Master 128K.
A worthwhile addition to any Master owner's library.

**All this for just £17 (NO VAT)**

NEW

## The Complete Mouse User Guide to BBC Micro

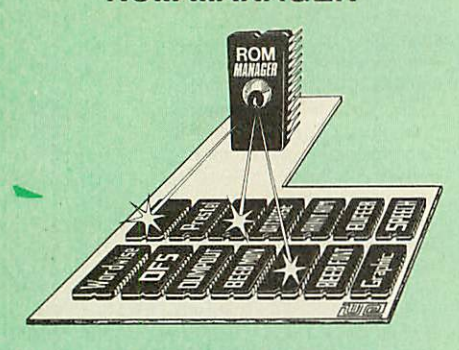
This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

**Price £5.95 (No VAT)**
**Example programs on Disc £4.95**

Continued→ → → → → → → → →

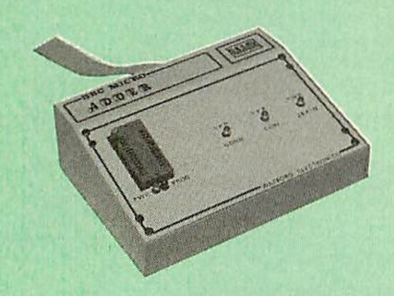
## ROM MANAGER




Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
*"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)*

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## ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.
Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

**£65 (£5 Carr)**

## TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs!
The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

## Servisol Foam Cleaner

This 415MI, king size multi-purpose foam cleaner spray is ideal for cleaning the Keyboard, Monitor, Disc Drive and your computer furniture surfaces. Simply spray on the surface to clean and wipe off with a clean cloth.

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## Antistatic Aerosol Spray

Ideal for cleaning and preventing static build-up on TV/Monitor Screens.

**£2.50**

## Aerosol Dust Spray

This simple to use aerosol spray is ideal for removing Dust and Dirt deposits from the Keyboards and similar inaccessible places. **£3**

## SPARES for BBC Micro

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|---|---|---|---|
| BBC Keyboard | £42 | Speaker | £2 |
| Master Keyboard | £62 | Keyswitch | £1.50 |
| UHF Modulator | £4 | 16MHz Crystal | £2 |
| Speaker Grill | £1 | 17.734 MHz Xtal | £2 |
| BBC Power Supply | £56 | 32.768MHz Xtal | £1 |
| BBC B Refurbished | | Master PSU | £59 |
| Casing | £20 | Master Casing | £39 |

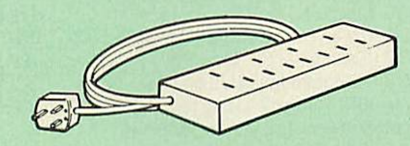
Replacement FLEXIBLE 17 way Keyboard Connector **£4**

## Surge Protector Plug

Fitted in place of your normal mains plug, this device protects your equipment (and data from corruption), against mains high voltage translent spikes/surges caused by lightening or thermostats switching.

Protection for only **£8.50**

## 4 Way Mains Distribution Socket



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## Aries Spike Cleaner Unit

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## ROM Extraction Tool

This extremely useful tool allows you trouble free chip insertion and removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip. **£2**

Metal Chip Extractor **£3**

## 28pin DIL HEADER PLUG

SOLDER type **£1.50** IDC CRIMP type **£1.95**

## 8 WAY DIP SWITCH

Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ keyboard

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28 pin ZIF SOCKET (Textool) **£6.95**




**CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383**

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(All ready made and tested)

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| to 3 pin DIN Plug + 1 Jack Plug | £2.50 |
| to 7 pin DIN Plug | £3.00 |
| to 3 Jack Plugs | £2.50 |
| **6 pin DIN to 6 pin DIN Plug (RGB)** | **£3.00** |

**DISC DRIVE POWER LEADS**

Supply from BBC power supply to standard Disc Drive connector.
Single **£3.00** Dual **£3.75**

**DISC DRIVE INTERFACE LEADS**

BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

## Miscellaneous Connectors

| | Plugs | Sockets |
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| RGB (6 PIN DIN) | 50p | 75p |
| RS423 (5 pin Domino) | 70p | 80p |
| Cassette (7 pin DIN) | 40p | 95p |
| ECONET (5 pin DIN) | 35p | 50p |
| Paddles (15 pin 'D') | 150p | 250p |
| Disc Drive Plug 4 way | 100p | – |
| 6 way Power Connector | 120p | 150p |

## Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below).

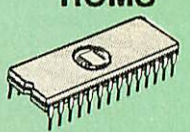
**£14**

**Watford POWER DUCK** **£8**

## CHIP SHOP

| | |
|---|---|
| DS3691 | £4.50 |
| DS88LS120 | £5.25 |
| LM324 | £0.45 |
| SN76489 | £5.50 |
| SAA5050 | £8.75 |
| UPD7002 | £6.00 |
| 2764-250nS | £2.80 |
| 27128A-250nS (12V5) | £3.00 |
| 27128-250nS (21V) | £5.25 |
| 27256-2 | £3.99 |
| 27512-2 | £7.99 |
| 27C101G (1 Meg) | £10.00 |
| 4013 | 60p |
| 4020 | £0.90 |
| 4164-15 | £3.25 |
| 4464-12 | £9.95 |
| 4464-15 | £8.25 |
| 4816 RAM | £2.00 |
| 41256-15 | £6.00 |
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| 6264LP-8K | £4.25 |
| 6502A CPU | £4.50 |
| 65C02 3M | £9.75 |
| 65C12 | £9.00 |
| 6512A | £10.00 |
| 6522 | £3.40 |
| 6522A | £4.50 |
| 62256ALS-15 | £10.00 |
| 6818 | £4.00 |
| 6845SP | £6.00 |
| 68B50 | £2.95 |
| 68B54 | £7.50 |
| 7438 | 40p |
| 74LS00 | 25p |
| 74LS04 | 25p |
| 74LS10 | 25p |
| 74LS123 | 80p |
| 74LS163 | 70p |
| 74LS244 | 80p |
| 74LS245 | £1.00 |
| 74ALS245 | £2.75 |
| 74LS373 | £1.00 |
| 74LS393 | £1.00 |
| 75453 | 70p |
| 75159 | £3.00 |
| 9637 | £2.00 |
| ICL7673PA | £2.00 |

## ASSORTED ROMS



| | |
|---|---|
| ACORN ADFS | £25 |
| ACORN BASIC 2 plus User Guide | £22 |
| Acorn BCPL | £42 |
| Acorn COMAL | £38 |
| ACORN DNFS | £17 |
| Acorn FORTH | £32 |
| Acorn Graphics | £25 |
| Acornsoft C Disc | £45 |
| Acorn LISP | £19 |
| ACORN LOGO | £42 |
| Acorn OS B+ | £25 |
| Acorn OS 1.2 | £14 |
| Basic Editor | £24 |
| BBC PCB Designer | £49 |
| Beebfont | £25 |
| Beebmon | £22 |
| Buffer & Backup | £20 |
| Communicator | £49 |
| Dump Out 3 | £25 |
| EPSON NLQ ROM | £25 |
| Graphics Extension Rom GXR-B | £21 |
| GXR-B+ | £22 |
| ISO Pascal | £51 |
| ISO-Pascal Stand Alone Generator | £30 |
| ICON Master | £28 |
| Logotron LOGO | £43 |
| MASTER OS ROM | £38 |
| Micro Prolog | £62 |
| Microtext Disc | £46 |
| Nicrotext Rom | £199 |
| NLQ DESIGNER | £25 |
| Pendown ROM | £30 |
| ROMIT | £29 |
| SERIAL ULA | £13 |
| TED | £35 |
| Termulator B, B+ | £28 |
| Termulator Master | £32 |
| Video ULA | £14 |
| ULTRACALC II | £26 |
| 1Mb OS ROM | £39 |

*The Aries IBM PC-XT 88 and Aries PC AT286 compatibles are now supplied with Digital Research's GEM, Microsoft MS DOS 3.30, GW-BASIC 3.21, the powerful Finesse 1.1 Desk Top Publishing package, Multiwriter WORDPROCESSOR & Spell-checker, PC Organiser and 12 months on site maintenance warranty. So you not only get the best all round value in PC compatibles, (£300+ worth of FREE Software & Hardware with every system), but you also get a complete and powerful WYSIWYG DTP software package that takes you from typewritten text onto typeset quality layouts. LOGITECH MOUSE too is included with the package. WATFORD GIVES YOU MORE FOR YOUR MONEY. (P.S. To operate Finesse DTP, you require a Hard Disc System).*

# ARIES PC-XT 88



# ARIES PC AT 286



**SPECIAL OFFER:** THIS MONTH WE HAVE TWO SPECIAL OFFERS FOR YOU.

1. You may purchase Aries UPRIGHT XT88-UP and Aries UPRIGHT AT286-UP systems, (see photograph above) for the same price as the desktop PCs.
2. On XT & AT Systems 6 and Systems 7 we are able to offer 0% FINANCE. (For details telephone 0923 37774 Ext 203, 223 and 201).

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- 16 Bit Intel 8088-2 or NEC V20 78108 microprocessor, running at 8MHz or 4.77MHz. (3 times faster than IBM PC/XT).
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- 8 expansion slots.
- 102 keys keyboard.
- RS232 with two ports
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- Mono graphics/parallel card (HERC Compatible).
- Legal BIOS and built-in games card and clock.

**Specification:**

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- Optional 80287 Maths co-processor
- 640K RAM standard expandable on-board to 4MB.
- 1.2M Single Floppy (optional 2nd Floppy/3.5" Winny/T.Streamer)
- CLOCK on System board, gives non stop DATE & TIME.
- 8 expansion slots.
- 102 key keyboard
- Serial/Parallel Card.
- HDD/FDD Card
- Switchable Speed 8/12M Landmark test at 16MHz
- 200W power cable
- Mono graphics/parallel card (Herc. Compt.)
- Slide in metal case with function display.
- Legal BIOS and built-in games card and clock.

## ● FREE 12 month On-site Maintenance warranty (UK mainland) included in the price

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# Watford Electronics

**JESSA HOUSE, 250 Lower High Street,**
**WATFORD WD1 2AN, ENGLAND**
**Telephone: (0923) 37774; Telex: 8956095;**
**FAX: 01 950 8989**

Acorn Computers Ltd. is already established worldwide with its high performance quality computer systems and is the only company in Europe to have developed its own RISC processor. We are constantly striving to improve existing products and have an impressive development programme for new products and new markets. As an Acorn user you may have the skills we need to ensure that our programme stays on course.

Over the next few months we are seeking to recruit specialists in the following disciplines to assist us in our development plans:

## HARDWARE DEVELOPMENT

Including ASIC and system design, industrial and mechanical design and draughting.

## SOFTWARE DEVELOPMENT

Requiring candidates with experience in operating systems, kernels, device software and graphics.

## DEVELOPMENT SERVICES

Encompassing production and quality engineering, CAD/LAN/WAN administration and component approval.

*Ref AU/JHW/016*

These are just a few of the opportunities which exist, so applications are invited from candidates whose specialist skills may not exactly match those disciplines described above, but who feel that their experience might be of interest to us.

## OFFICE AUTOMATION PROJECT LEADER

Responsible for the project management and development of internal office automation systems, you will assist with the overall IT strategy development.

Currently operating with a range of systems including Acorn, IBM, VAX and Sun-based systems, etc, you will have broadbased communications experience, capable of defining the complete specification for internal schemes ranging from word-processing and desktop publishing to fax and electronic mail. Additionally, you will be required to assess a range of software packages.

*Ref AU/JM/013*

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*Ref AU/DS/015*

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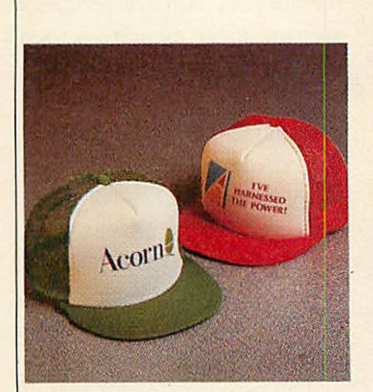
We offer sound career prospects, training to meet future needs, excellent salary packages and benefits which include assistance with relocation where appropriate.
To apply for any of these positions, please write with full career details to Mrs. Janet Henson-Webb our Senior Personnel Officer at Acorn Computers Limited, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Telephone: 0223 245200.

# APPOINTMENTS

The choice of experience.

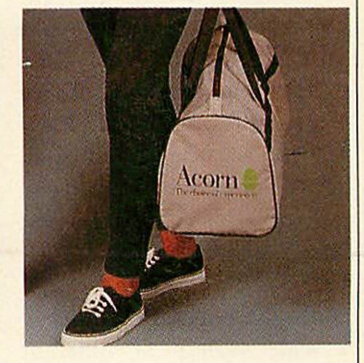
# OFFERS

## SET THE STYLE WITH ACORN










Let people know that you have one of the best microcomputers with the new Acorn range of products which are only available through *BBC Acorn User* magazine.

Acorn's T-shirt, sweatshirt and sports shirt are all made from a polyester/cotton mix giving hardwearing garments which are both cool in the summer and comfortable in the winter. Ideal for social as well as sporting events. For even more style there is the Acorn baseball cap.

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Acorn's half pint mug – bright, strong and practical – is just the thing for late night sessions in front of your micro.

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Finally let us introduce you to *Archie*, everybody's soft cuddly friend. Archie wears either an Acorn T-shirt or one with the well-known Archimedes logo, he's great fun as well as being of superb quality. Why not give Archie a home either as a gift or a club mascot?









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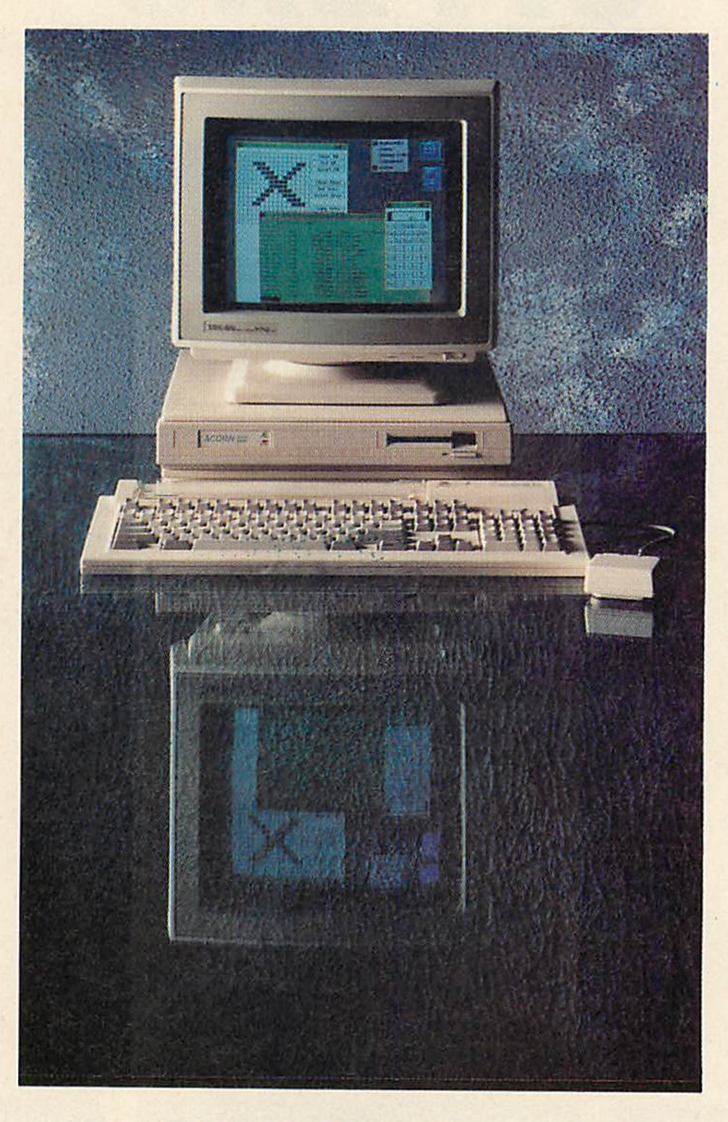
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# POWER TO THE PEOPLE

**The R140 has cracked open a whole new market for Acorn. But what is this Unix anyway?**



***James Cox***



At the beginning of this year Acorn announced the R140 – an entry into the fiercely competitive Unix market. Pitched at the low end of the market, the R140 is claimed to break through the price barrier and in doing so, it takes on some computer industry giants like IBM, Digital and Sun.

The R140 is a departure for Acorn and for most *BAU* readers, so what is Unix all about and what exactly do you get with this £4000 cheapest Unix system.

For a so-called standard operating system, Unix comes in a wide variety of different forms. The two most important flavours of Unix are known as 'System V' from the giant AT&T company of America and '4.3 BSD' produced by the University of California at Berkeley.

The R140 bases its version of Unix on 4.3 BSD. Most Unix workstations are based on this standard. The System V version is used on machines for more 'commercial' tasks such as wordprocessing or transaction processing.

Unix is best thought of in two parts – the toolset comprising the programs supplied with the operating system to perform day-to-day tasks and the Kernel which is the software that controls the machine itself.

The R140 Unix kernel provides a multi-tasking environment. With some hardware support, the Kernel ensures the task processes, such as wordprocessor, compiler, print spooler or games, do not interfere with each other. Each process is allocated a chunk of memory that it alone is allowed to use.

If it tries to access memory outside of this individual hunk, the process is terminated by the kernel.

This means a process that 'runs amok' is less likely to crash the machine, because it is not allowed to write into the memory reserved for the kernel, or into the memory space of other processes. Unix is also multi-user, so many different people can use the machine.

Whenever a user wants to use Unix, they must first log in, by giving a valid user name and password. Whenever they run a program or create a file, that program or file has their name associated with it. This means users can kill off their own programs only.

The kernel also provides facilities to protect files. Each file has read or write permission bits associated. These can be turned off, so that only the owner of the file can access it.

Whenever a program is run, it uses up part of the main memory, so as more processes are run, more memory is used up. A virtual memory system allows more processes to be run than there is real memory to accommodate them.

By a combination of hardware and software techniques, the kernel uses part of the disc as an extension of memory. So the total number of processes that can run is increased.

The kernel provides a set of facilities known as inter-process communication (IPC). Normally, because of the memory protection, processes can not easily exchange data with each other. IPC facilities allow them to do so without the kernel terminating the process. One of these IPC methods is called a pipe.

Two processes can set up a pipe between them. Data written by the process at one end can be read by the process at the other.

The kernel implements the Unix file system. The file system is hierarchical like the ADFS. On other file systems such as Risc OS or MS-Dos, the user is aware of the physical drive on which the file is held. (For example, a hard disc file on Risc OS has the name ':4.$.file').

Under Unix, the physical disc drives are hidden from the user. When the machine boots, the physical disc drives are set up so that it appears to the user that there is only one directory structure, although it might be spread across many physical disc drives.

The kernel also provides facilities to access Ethernet networks. At the basic level, there are facilities to allow a program on one machine to exchange data with another machine in the network – allowing machines to talk to each other.

Built on top of these basic facilities is the Network File System (NFS). Using NFS, a file system from another machine in the network can be incorporated into the directory tree of the local machine. The NFS software detects that the machine is accessing a file held on the remote machine and gets the data over the network from the remote machine.

The user is not aware that another machine is really holding the files.

The Unix toolset comprises over 300 separate programs. By contrast you get about 75 with Risc OS. There are two command interpreters – the 'Bourne Shell' and the 'C Shell' – which provide a powerful means of interacting with Unix.

These command interpreters are so powerful that sophisticated programs can be written using them. It took just five minutes using the Bourne Shell and the Unix tools to write a word frequency analysis program for this article.

These command interpreters do not, however, provide a graphical interface – instead it is line-based like the Arthur interface on the Archimedes – and users have the choice of which interpreter they wish to use.

The shells provide a notation for creating pipes between processes. This has the effect that the output of one process can be fed into the input of another process. Using a pipe, a user can construct customised tools.

For example, a user might have a directory containing many files. When these are listed, there are so many, the listing scrolls off the screen. In MS-Dos, there is a special option to the DIR command to paginate the output. If users invoke a command without the paginate option, they are stuck.

On Unix, there is a paginator which can be grafted on to the output of almost any command. Many of the Unix tools have been written so that they can be connected in this way.

The toolkit provides a screen editor called 'VI'. This is a very powerful editor, especially useful for people writing programs. The problem with VI is that it has an inconsistent command set and is not at all easy to learn – people learning VI swear about it, those who have learnt it swear by it.

The R140 comes with some text manipulation commands, such as a word count program 'wc', a file differencing tool 'diff', a sort program and a strange but powerful text manipulation language which is called 'awk'.

Included in the toolset are text processing programs called 'nroff' and 'psroff'. These provide a powerful means of formatting text. The user writes a document as a file containing text and formatting commands. The file is then passed to the formatter that produces formatted output.

The nroff program provides output to typewriter-like devices and psroff is for output to laser printers. Using these tools, professional grade text processing is possible. However, they do not provide Wysiwyg and it takes a long time to learn to use them effectively.

This is typical. Unix was originally designed as a programmers' environment and this persists today.

Unix provides good tools for developing programs. The R140 comes complete with a C compiler and an Arm assembler. The C compiler understands the dialect of C used on most Unix machines and the new American National Standards Institute (ANSI) dialect.

As well as the compiler, there are other programming support tools supplied, such as 'make' which compiles a program or suite of programs from many different input files, but only compiles the files that have changed since the program was last compiled.

The debugger, 'db x' provides facilities to trace the execution of a running program. There is also an execution profiler. This is a utility that adds in extra code when the program is compiled and times the execution of the program so the programmer can determine where the program spends its time, and optimise any slow parts.

The compiler is provided with a number of subroutine libraries, for performing some standard functions, maths functions and screen handling. Unix is more complicated than many other systems and so provides many system administration tools.

Among these are a disc usage monitor, to see who is using up all of the file space, a disc checking program and many commands for monitoring the status of the machine (for example, check the running processes and provide machine loading statistics).

Traditionally, users have accessed Unix using a terminal attached to a serial line. The form of interaction was type a line, press RETURN and wait for a response.

Most of the Unix tools work in this way. The advent of high resolution displays has meant users are no longer restricted to a 25 line by 80 character display. A windowing system allows areas of the screen to behave like terminals, so terminal based software can still be used but viewed in a windowing environment.

Appropriately written software can use the environment to provide menus and icons, giving the familiar Wimp interface.

## WHAT IT ALL COSTS

The R140 workstation is based closely on the Archimedes 440 system. The machine comes with the Arm processor, 4Mb of memory, an internal 60Mb Winchester disc, a floppy disc, a serial and a parallel port.

The price of £3500 + VAT includes a year's on-site maintenance and hotline support, provided by Granada Microcare. The documentation pack consists of a Welcome Guide, Operations Guide, Risc iX User Guide, X.Desktop Guide, Archimedes User Guide and a BBC Basic Guide.

There are a number of hardware options available. The base R140 does not include a monitor. The choice is between a low resolution monitor, as used on most Archimedes systems, a medium resolution (640 × 480) colour monitor, or a high resolution (1152 × 900) monochrome monitor.

The medium resolution monitor seems to provide the best price/performance compromise.

The floating point podule (£599 + VAT) is now available for the R140 and considerably improves the machine's floating point performance.

The SCSI Adaptor (£299 + VAT) allows the connection of peripherals conforming to the SCSI interface. These include high capacity disc drives, tape cartridge drives, video disc players and so on.

The internal hard disc controller can support two ST506 Winchester discs. A second hard disc to run off the internal controller is available.

In due course more add-on hardware will be available. All the Archimedes podules are electrically compatible but need a Unix software driver to work with the R140.

Extra documentation is available, covering Unix system administration, more depth on some of the Unix tools and the X Window System.

Early window systems all invented their own ways of interacting with the user and the program. This meant programs and users were not portable between different window systems.

The X Window System was developed in the USA to provide a portable, standardised way of providing a window system. The X Window System is the windowing method on the R140.

Many Wimp-style applications are provided with the R140, including a screen editor, a pixel editor and a calculator that can even be made to work like a slide rule.

Ordinary Unix applications can be run in the window environment by using the X terminal emulator program. The X Window System environment provides a C language subroutine library which programmers can use to create their own X Windows applications.

Many potential users are put off Unix by the line based interface, the size and complexity of the Unix toolkit and the curious program names used under Unix ('ls' to get a directory listing of your files, 'cp' to copy them, and 'cat' to type them on the screen).

Many users prefer a pick-and-point interface where all the tools are presented in a graphical form and they are invoked with a mouse.

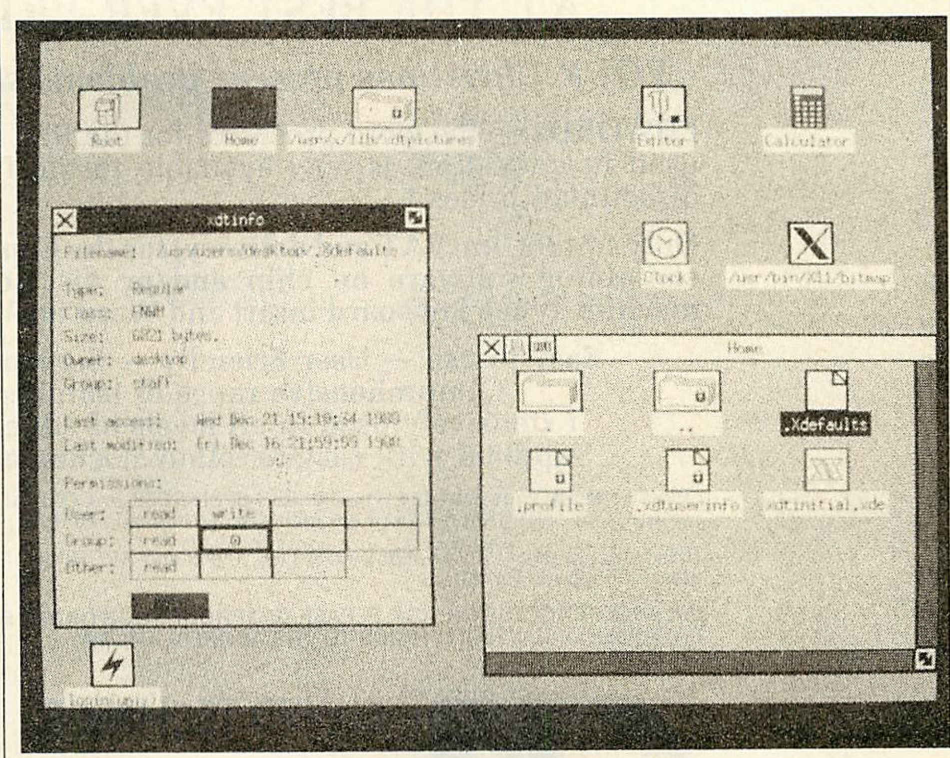
The R140 is provided with a tool called 'X.Desktop', provided by IXI of Cambridge. This provides just such an interface: icons can be clicked to run a program, files can be dropped onto editors to edit them and so on – just like those features found in Risc OS.

The beauty of X.Desktop is that experienced users can customise the appearance of the screen to provide exactly the interface they want. The power of Unix can be made available to a much wider public.

The kernel provides support for networking but there are also user tools for making use of the network to allow a user to work on another machine in the network with the local machine behaving like a terminal connected to the remote machine, to transfer files to, or log in to, a non-Unix machine on the same network.

The electronic mail system allows users in the network to exchange messages with each other. However, the electronic mail does not interface with other public mail systems such as BT Gold.

The sheer number of tools brings problems. It is difficult even for experienced users to remember the names and




**X. Desktop enables users to customise the appearance of the screen**

parameters of each command.

The R140 provides an online manual containing detailed information on how each command and library subroutine works. This is not a tutorial but it reminds the experienced user how to use a particular feature.

The R140 comes with a few extra features not found on many other Unix systems. The first of these is file compression. The R140 comes with a huge number of program executable files, all held on disc. With a relatively small disc and without drastic measures the software Acorn wished to provide would not all fit.

So, Acorn introduced a data compression scheme for its executable files. This squeezes program files to half size. When a compressed program is to be run, its compressed form is copied from the disc into memory, expanded to normal size and then run.

Although it takes time to expand the file, program startup can still be quicker because a smaller image is transferred to memory from disc.

The second extra feature is shared libraries. Running programs can share memory segments holding common subroutine libraries. For example, many C programs use the 'printf' subroutine. Without a shared library, each program file would contain a copy of the code, and each running program would have its own copy of the code in memory.

With a shared library, only one copy of the code is held in memory and each running program using the routine uses the same copy of the code.

This considerably reduces the amount of memory consumed by running programs and reduces the disc space used by non-running programs The R140 has a floppy disc which conforms to the Unix formats, allowing the floppy disc to be used to exchange data with other Unix machines.

Thoughtfully, Acorn has provided tools so discs in both MS-Dos and ADFS formats can be read and written by Unix, so data files can easily be transferred to Risc OS machines or PCs.

## R140 compared

So, how does the R140 compare with other Unix systems, and for that matter, with PCs and the Archimedes.

There are many different Unix workstations available. One of the market leaders is from Sun Microsystems. Sun workstations tend to be the standard by which other machines are judged.

On price alone, the R140 wins hands down; no other manufacturer provides a networked station, with local disc and a 640 × 480 medium resolution display for under £4,500. It is probably the cheapest Unix workstation.

For programmers, the R140 provides all the features expected of a Unix system. The interface to the operating system is exactly that of 4.3 BSD and the 'usual'

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Unix compilers and tools are all provided. This is how a workstation should be.

The ability to run the X Window System in colour is a big advantage. It provides the same user interface as is found on other machines using X. The X.Desktop software means users no longer need to learn anything about Unix itself to run their applications successfully. For users wishing to run applications, they will probably find an R140 with a medium resolution monitor better than a PC or a dumb terminal.

The list of applications available is growing but at the moment the list of titles for the R140 is shorter than its main competitors. As the machine becomes established, more and more titles will become available.

System Managers will certainly like this machine. The R140 will fit easily into their existing networks. It will be able to share files, using NFS, in the same way as other workstations on the network.

The hardware support arrangements will be as expected, but with the added bonus that the support for the first year is included in the price.

The R140 in particular, and Unix workstations in general provide a far better working environment than a PC. The lack of suitable support tools on a PC is a big problem.

For some applications, there is little to choose from between Unix and a PC – an editor is much the same whatever operating system it is run on.

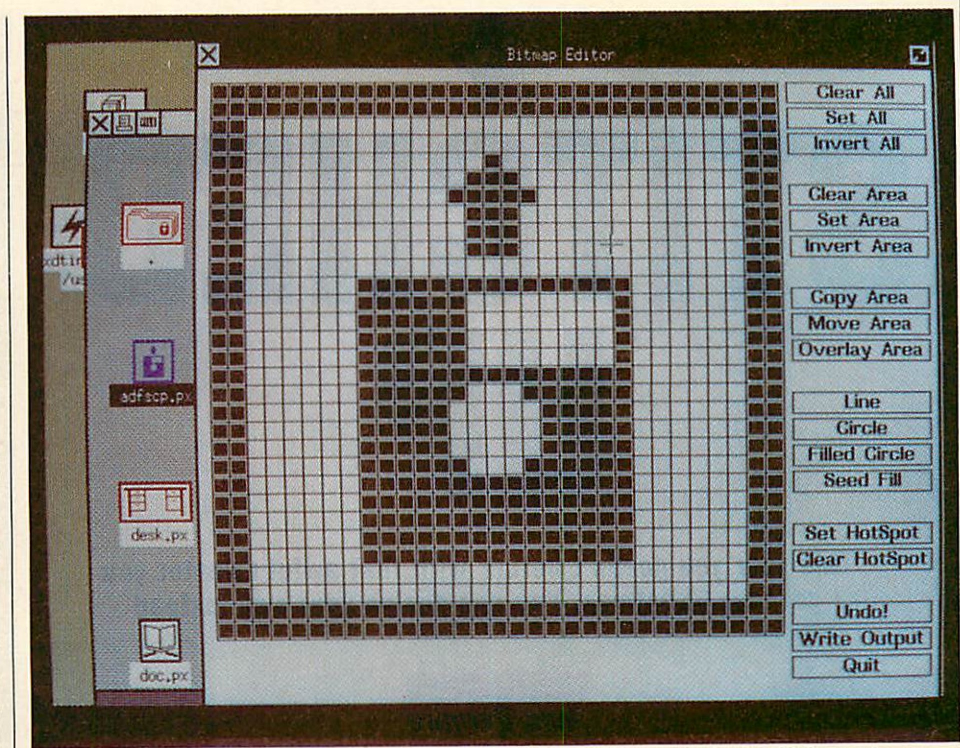
However, users of integrated application suites such as *Uniplex* (a suite of many different programs) will find the application works much better because of the more powerful facilities which are available under Unix.

The PC world does have many more applications available than Unix does but Unix is catching up.

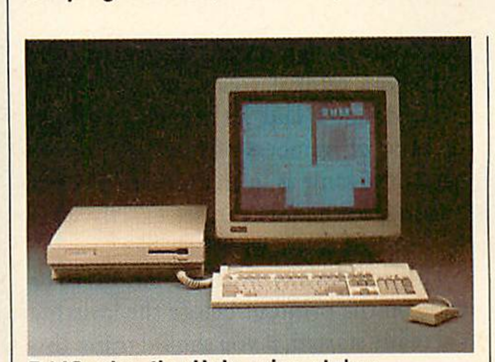
Despite the similar hardware, it is less easy to compare the R140 to the Archimedes. The two machines serve complimentary needs. The R140 is aimed at commercial and scientific sites which already have Unix and a network and need more workstations or where a network of machines is being put in for the first time.

The Archimedes is aimed more at the smaller user – the home market and the low end of the commercial sector.

These different markets have very different needs, and these are reflected in the different facilities provided by the different systems. The great advantage for Acorn is that the Arm is powerful enough to enable common hardware to serve both markets.




**For programmers, the R140 provides all the features expected of a Unix system**



**R140 wins the Unix price stakes**

## Bundle of joy

The R140 comes bundled with the many useful tools already described but to be of any use, a machine needs a suite of applications to provide solutions to user needs. For an operating system like Risc OS, the applications must be written from scratch. Under Unix, existing applications can be ported to the machine.

The process of porting an existing application, written in C from one Unix machine to another is often simply a matter of re-compiling the code on the new machine. Acorn has negotiated with the suppliers of the major Unix packages to port software across to the R140.

The complete list of packages which are available for the R140 is much too long to reproduce here but three of the most important products available are:

*Uniplex* – the most popular office automation product for Unix machines.

It provides an integrated package for wordprocessing, spreadsheet, database and time management. It is also possible for software developers to integrate additional functions into the Uniplex environment.

*Sea Change* – this is a 'fourth generation' language, and database product. The database provides facilities for storing large amounts of data and the language allows screen-based applications to be built to manipulate the data. By this means, sophisticated solutions to particular users' problems are built.

*Uniras* – this package provides a suite of tools for producing graphical output such as contour maps and bar charts. The output can be produced on a wide range of output devices, such as the screen, laser printers and plotters.

There is no doubt at all that Acorn has provided a very good Unix system. Buyers will be strongly tempted to purchase the R140 for two reasons. It has all the facilities expected of a Unix machine and most of the software titles one would look for are readily available. And the low price means buyers can get more of them for the same money.

Unix is indeed a radical step, but with the R140 Acorn has produced the right machine at the right price and the company's future in this area looks rosy.

# STITCHED UP

**This year you needn't bother with that awful sweater you got last Christmas. You can design your own instead**

***Joan Barnard***

You know how it is. Every year you get the usual C&A jumpers for Christmas just like everyone else has. So you decide to ask Auntie Agatha for something a little more personal. She of course spends all year knitting the latest design from *Women's Woolley Weekly* and you're no better off.

Now, why can't she knit you a sweater to your own design...

The problem is that producing a knitting pattern for any design more complicated than vertical stripes involves a lot of work and much messing about with graph paper.

The *KnitOne* program in the yellow pages works on the Electron, BBC micro, Master and Archimedes (in Beeb-type display modes) with either disc or tape (disc is of course a lot more convenient) and it enables users with a printer to select a whole screen or just part of a screen in any graphics mode and convert it to a knitting design.

When the knitting pattern is produced by the computer, first the design is printed out, as it will appear on the garment and then the rows which must be knitted to create the design.

The design can either be incorporated into the pattern for a garment such as a sweater, or knitted separately and stitched onto the front of a sweater you already have (that grotty C&A one you got last Christmas, for example).

You could design dozens of screens for a patchwork quilt if you want...

The design is laid out in such a way that the ratio of numbers of rows is approximately the same as in an ordinary piece of knitting, so the user can see exactly what the finished work will look like.

This enables any small alterations to be made on the printout before the knitting is actually started, if you should think this desirable.

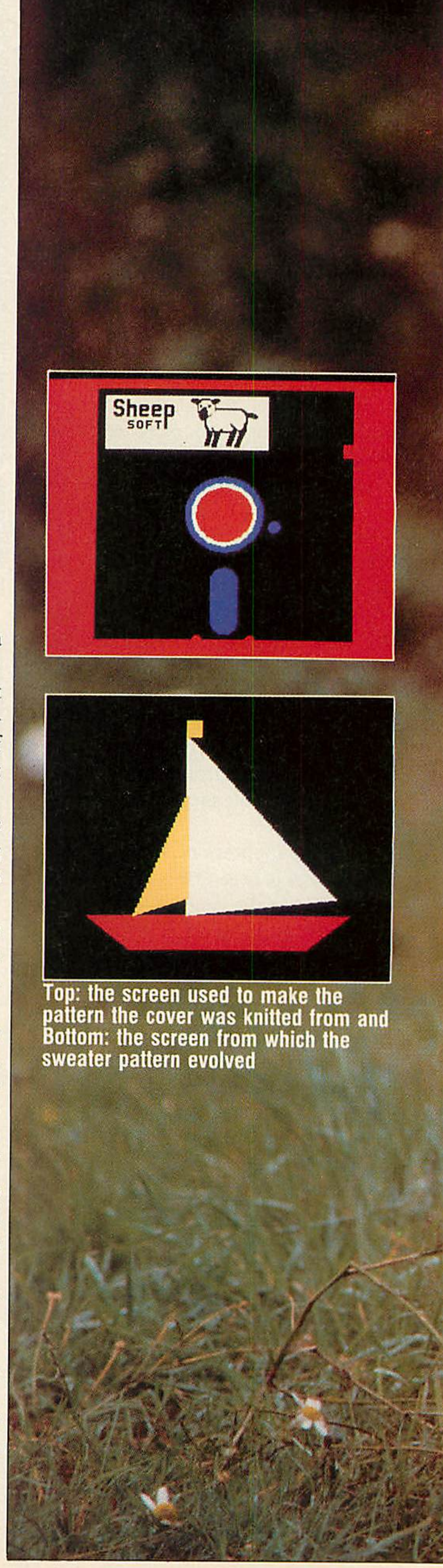
When the program is actually run, the user is asked for the name of the screen they want to be loaded and the screen mode (0, 1, 2, 4 or 5).

Once loaded, an adjustable frame can be moved using the cursor keys, if required, to select any part of the screen for the pattern. If the whole screen is selected for the design, the resulting pattern necessitates using quite a large number of stitches and rows, which may not always be convenient, especially if it is to be used for a small garment like the sample sweater shown opposite.

In this case the user is given the option of two different sizes for the pattern – either large or small.

This problem does not arise when just parts of screens are used for the designs.

The user now has the option of changing the colours of the design if so desired, though this option is not given in the case of mode 2 screens since the full range of colours is already available when the screen is first created.




**Top: the screen used to make the pattern the cover was knitted from and Bottom: the screen from which the sweater pattern evolved**



Marc, all the way from Australia, and not at all used to the English weather takes advantage of the finished garment

After all the information required has been extracted from the user, the screen is reloaded and information about the screen itself read straight from the screen and printed out.

This prevents having to store picture information anywhere in the computer beforehand and so makes the program very economical on memory.

However, this does mean that shadow Ram for screen memory must not be used with this program as it stands, but must be turned off before the program is run.

During the printing process the computer will pause at the end of each stage and the user will be asked to press the space bar. This is to enable the user to wind the paper down to the next sheet or to load another cut sheet if preferred, rather that printing over the page join.

Printing recommences as soon as the space bar is pressed.

The program is very 'user friendly', with clear instructions being given at all stages, so no confusion should arise when running it.

## Modifications

The only alterations which might have to be made to the program relate to printer instruction. The instructions given are for a Taxan printer which is Epson compatible, but users with other printers might have to alter the following lines.

290 VDU1,12 – causes all the data in the printer buffer to be printed out and the paper to be fed forward in readiness for starting a new page.

```
Row  1   42 blue
Row  2   42 blue
Row  3   42 blue
Row  4   9 blue, 24 red, 9 blue
Row  5   8 blue, 26 red, 8 blue
Row  6   7 blue, 28 red, 7 blue
Row  7   6 blue, 30 red, 6 blue
Row  8   5 blue, 32 red, 5 blue
Row  9   4 blue, 34 red, 4 blue
Row 10   10 blue, 1 yellow, 6 blue, 2 white, 23 blue
Row 11   15 blue, 10 white, 3 blue, 3 yellow, 11 blue
Row 12   11 blue, 5 yellow, 1 blue, 16 white, 9 blue
Row 13   6 blue, 19 white, 6 yellow, 11 blue
Row 14   11 blue, 6 yellow, 19 white, 6 blue
Row 15   7 blue, 18 white, 5 yellow, 12 blue
```

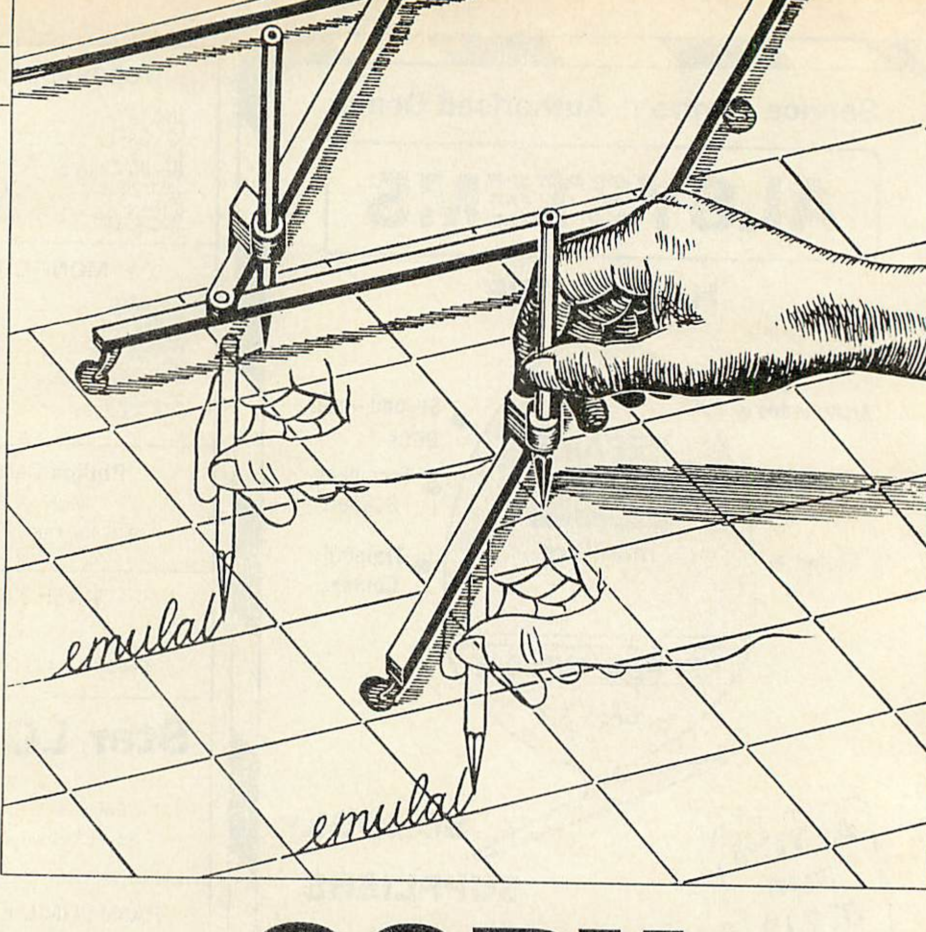
A segment of the sweater pattern generated with the help of the program in the yellow pages

890 *FX6 – turns off printer ignore character 10 to generate a line feed after a carriage return.

940 VDU1,27,51,18 – sets the line feed to 18/216 inches which is just right for printing out the design.

1080 VDU1,27,50 – returns the line feed to its default value of 1/6 inches for printing out the pattern rows.

1090 VDU1,12 – as line 290 above.




# COPY CATS

**Use our program to emulate the 68000 chip found in Macintosh, Amiga, and Atari ST computers**

**Richard Browning**

Emulation is not a new idea. Ever since the teletype (and probably before) it has proved desirous for one machine to act as if it were, in fact, another.

More recently with the Archimedes, Acorn has produced the PC emulator and Beeb emulator. And now folks – it's the 68000 emulator!

Before you start jumping around yelling, please observe a few facts:

- The program given with this article emulates only some MOVE and logical instructions and a TRAP – the program would be too large if more were added.
- Even though lovingly hand-crafted in machine code, it's not wonderfully speedy (anyone got a 16 MIP Arc yet.. ?).
- Your ST, Amiga and Mac owning pals won't appreciate your reminder that their machine is inferior.

Also, a really basic level of thinking is required in this business.

The program includes a 'monitor' with which you can 'write' 68000 programs and study their progress and status. 'Programs' are written by poking the instructions into memory.

## The Motorola 68000

This chip finds itself in the weirdest environments. It powers the Atari ST, Amiga and Mac series. Its more powerful brothers (or sisters), the 68020 and 68030, provide the horsepower in many a workstation (Sun 3 series, Apollo DN series) and even the kid sister (or brother), the 68008, is known to have powered the infamous Sinclair QL.

The 68000, apart from its instruction set, has another major difference from the Arm CPU in the Archimedes. It organises data words in a high-low format unlike the Arm's (and 6502's) low-high format.

## The in(struction) set

The 68000 being a CISC (Complex Instruction Set Computer) chip, obviously possesses more instructions than the Arm's Risc structure incorporates, although it is debatable if the variations it gives on each instruction improve on those in the Arm.

Like the Arm the 68000 has 16 registers but they are split into eight data registers and eight address registers. Some instructions can only operate on address registers and some only on data registers.

For example, address register operations aren't allowed on byte-sized objects.

Address register 7 (a7) is the 68000's program counter, with a separate status register which differs from the all-in-one program counter/status register R15 of the Archimedes.

In fact, there are two stack pointers on the 68000, one used in 'supervisor' mode and one in 'user' mode.

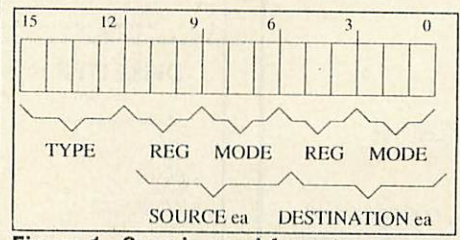



**Figure 1. Opcode word format**

The difference between these is that supervisor mode can access certain I/O and Ram locations in unavailable user mode. However, most micros with a 68000 don't fully use these modes anyway.

The 68000's registers are all 32-bit and the CPU has a 16-bit data bus.

## The approach

There is no simple cut-and-dried way of making one CPU act like another.

One possible way is to take the 68000 code and compile it directly into Arm code. Another is to take the 68000 assembly source and compile that into Arm code.

ILLUSTRATION BY BARBARA LOFTUS

One more method (the one I'll use here) is to get the Arm to emulate the 68000 in real time.

Repeating myself, the Arm is a 32-bit beast and the 68000 is merely 16-bit. This means an instruction on the 68000 may only occupy two bytes – an instruction on the Arm takes four.

Also, the bytes on the 68000 are stored the 'wrong way round', in a high-byte followed by a low-byte format.

So our emulator will not only have to cope with the huge range of instructions and addressing modes offered by the 68000 but will also have to reverse the bytes in order to operate on them.

## The instructions

As a CISC chip, the 68000 has many instructions. They include the normal register/memory movement opcodes and more obtuse stack-oriented instructions like LINK. Coupled with the varied addressing modes of the 68000, a massive library of code is defined.

Broadly, the instructions and addressing modes are arranged in memory in the format shown in figure 1.

Note 'ea' is the 'effective address', which is just the same as saying how the opcode will determine the manner in which it should access an operand.

The top four bits governing what instruction or group of instructions to use are summarised in figure 2. Here, 'cc' means the instruction depends on condition codes – DBNE (decrement and branch if not equal), BEQ, and so on.

| TYPE | INSTRUCTION |
|---|---|
| 0 0 0 0 | Bit Operations and MOVEP |
| 0 0 0 1 | MOVE byte |
| 0 0 1 0 | MOVE long word |
| 0 0 1 1 | MOVE word |
| 0 1 0 0 | Miscellaneous, e.g. EXT, LINK |
| 0 1 0 1 | ADDQ, SUBQ, Scc, DBcc |
| 0 1 1 0 | Bcc, BSR |
| 0 1 1 1 | MOVEQ |
| 1 0 0 0 | OR, DIV, SBCD |
| 1 0 0 1 | SUB, SUBX |
| 1 0 1 0 | Unused |
| 1 0 1 1 | CMP, EOR |
| 1 1 0 0 | AND, MUL, ABCD, EXG |
| 1 1 0 1 | Rotate (+extend), shift |
| 1 1 1 1 | Unused |

**Figure 2. Instructions/Instruction groups**

The rest of the word (the last 12 bits) sets the addressing mode and registers of the instruction for the source and destination. The modes are shown in figure 3.

Extension words are required when memory is used as source or destination operands. If there is only one memory access then there is only one extension word. If two (source and destination) memory accesses are required, two extension words are specified.

The extension word could be a 32-bit immediate constant, hence the maximum length of any one instruction with extension words could be 10 bytes!

There really isn't enough space to describe the addressing modes here. If you get really interested then have a look at the references given later. Briefly, the 68000 has all the modes the Arm has got and a few more as well.

|  | MODE SETTING | REGISTER NUMBER | ADDRESSING MODE | MODE DESCRIPTION |
|---|---|---|---|---|
| 1 | 0 0 0 | n | Dn | Data Register Direct |
| 2 | 0 0 1 | n | An | Address Register Direct |
| 3 | 0 1 0 | n | (An) | Address Register Indirect |
| 4 | 0 1 1 | n | (An)+ | A reg ind + postincrementr |
| 5 | 1 0 0 | n | -(An) | A reg ind + predecrement |
| 6 | 1 0 1 | n | d16(An) | A reg ind + displacement |
| 7 | 1 1 0 | n | d8(An,Reg) | A reg ind + index reg |
| 8 | 1 1 1 | 0 0 0 | d16 | Absolute short |
| 9 | 1 1 1 | 0 0 1 | d32 | Absolute long |
| 10 | 1 1 1 | 0 1 0 | d16(PC) | PC + displacment |
| 11 | 1 1 1 | 0 1 1 | d8(PC,Reg) | PC + index reg |
| 12 | 1 1 1 | 1 0 0 | #d8,#d16 or #d32 | Immediate |

**Figure 3. 68000 addressing modes**

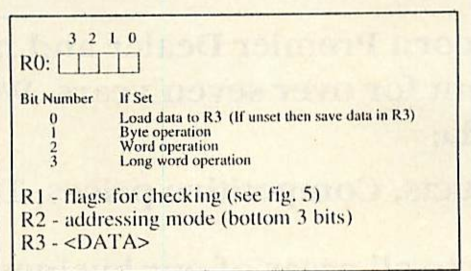



**Figure 4. Decoder routine and parameters**

| BIT | MODE ALLOWED (if set) |
|---|---|
| 0 | 1 |
| 1 | 2 |
| 2 | 3 |
| 3 | 4 |
| 4 | 5 |
| 5 | 6 |
| 6 | 7 |
| 7 | 8 |

**Figure 5. Addressing check flags (R1)**

| UNUSED | | | X | N | Z | C | V |
|---|---|---|---|---|---|---|---|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

**Figure 6. 68000 status register**

| BIT: | 15 | | | | | | | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MOVE.B | 0 | 0 | 0 | 1 | DEST. REG. NO. | DEST. ADDR.MD. | SOURCE ADDR.MD. | SOURCE REG. NO. | | | | | | |
| MOVE.W | 0 | 0 | 1 | 1 | DEST. REG. NO. | DEST. ADDR.MD. | SOURCE ADDR.MD. | SOURCE REG. NO. | | | | | | |
| TRAP | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | TRAP NO. | |
| OR.SIZE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | SIZE | DEST. ADDR.MD. | DEST. REG. NO. | | | |

| SIZE | |
|---|---|
| 0 0 | = .B |
| 0 1 | = .W |
| 1 0 | = .L |

**Figure 7. Implemented opcode formats**

## The program

The aim is ultimately to be able to download raw 68000 data to the Arc which can then be run straight off.

Thus, absolutely everything needs to be exactly mimicked, from the instructions and addressing modes to the program counter and status register.

Register storage is easy, it is just some free space to store the four bytes of each register.

The approach for retrieving and dealing with the instructions and addressing modes is similar.

As you already know, the instruction or instruction group is defined by the top four bits in each code word, those bits can be isolated in order to reference a table of branches to routines to deal with the appropriate code.

The same approach is used for the addressing modes – the mode bits are masked off then used to index a table of branches to the correct mode routine.

When the instruction routine is called, it knows that em_inst (the Arm register) holds the entire instruction word.

It then passes the appropriate addressing mode bits (in R2) to the mode decoding routine. Because there are separate routines for byte, word and long-word operations the mode decoder must know which routine is which.

This is achieved by setting bits in R0, which is then passed on to the decoder routine (figure 4).

Note that bit 0 tells the decoder that it is to store or retrieve data. Register R1 is also passed and its bits are set according to the range of addressing modes allowed (see figure 5).

As I mentioned earlier, some instructions can access only certain modes. Also, some instructions' source and destination mode ranges may differ so two sets of flags are required per instruction routine.

So R0, R1 and R2 are passed as parameters to the addressing mode decoder. R3 is used for data transfer – data to be saved is passed to the decoder in R3 or is passed back via R3 if data is being retrieved. The instruction routine can then feel free to fiddle with the data as required and has no need to worry about memory formats.

Figure 6 shows the arrangement of the 68000 status register. It is essential the

register's condition codes are set and cleared appropriately according to the data being transferred within the instruction routine. Remember that most instructions on the 68000 affect this register. The Arm only alters flags when you ask it to (excepting a few instructions).

## Adding an instruction

You may well want to add your own instructions to increase the emulating capabilities of this program. There are four points to watch.

- Don't use any registers above R9.
- Strictly observe the rules for using the addressing mode decoder and note that the decoder may change most of the Arm's registers.
- Act appropriately if the decoder returns an error (Z=0) such as a B error.
- Ensure the 68000 status register is adjusted properly.

If these points are followed, then there should be no problem inserting your own routines.

The table of instruction routines begins at main_instruction_set. For your own routine, simply add a branch in the appropriate place.

The terminator of your routine should be B exit, with the stack left in the same condition as it was when your routine was entered.

## Current implementation

The program currently supports the following instructions:

| | |
|---|---|
| MOVE.B | (opcode = 16) |
| MOVE.W | (opcode = 32) |
| TRAP | (opcode = 64) |
| PR.B | (opcode = 0) |
| OR.W | (opcode = 0) |

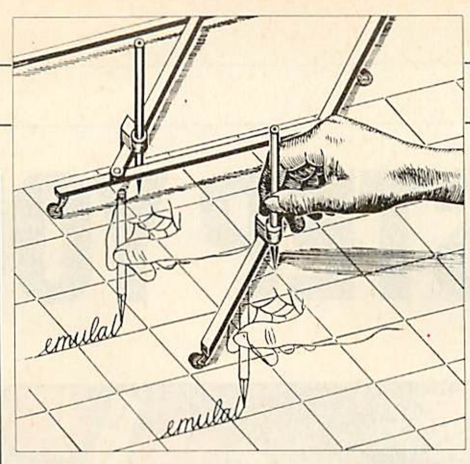
The memory layout for these instructions is given in figure 7.

Addressing modes 1 to 7 (figure 3) is included. I left the last mode out because it should be an easy lesson to write the routine to incorporate it.

However, the OR routines have their own code to handle the immediate data required for them to operate, so they are fully functional.

All the routines set the status register correctly and operate on the correct addressing modes.

The implementation of TRAP simply prints out the character whose Ascii value is in the low byte of D0.



```
  INPUT         OUTPUT                          COMMENT

* DR 1          Data Reg 1 = ?
65
* P 4097        Poked (word): &1001             MOVE.B D1,D0
* P 64          Poked (byte): &40               TRAP
* EMULATE 0     Starting emulation from &0
* EMULATE 2     Starting emulation from &2
                A
*
```

```
  INPUT         OUTPUT                          COMMENT

* SETMEM 0      Reset memory pointer to &0
* P 16          Poked (byte): &10               MOVE.B D0,(A1)
* P 17          Poked (byte): &11
* P 64          Poked (byte): &40               TRAP
* AR 1          Address Reg 1 = ?
100
* SETMEM 100    Reset memory pointer to &64
* P 66          Poked (byte): &42
* EMULATE 0     Starting emulation from &0
* EMULATE 2     Starting emulation from &2
                B
*
```

**To run the two example programs above, enter the values given in sequence**



***HELP shows available instructions**

**The second example program in operation**

## The monitor

The monitor provides access to the emulator, its memory and registers. You can poke either byte or word length values, (it automatically detects which and then increments the memory pointer appropriately) display memory and clear memory.

Most errors are trapped, so nothing untoward should happen.

A help screen is available (HELP). The screen photograph below shows the HELP command displaying the instructions that are available.

If you wish to add your own instructions, just tag its name on to the data list and define it as a function. It must deal with its own errors – perhaps using ON ERROR LOCAL.

Note that all the monitor does is to alter the emulator registers. When the emulator is run from the monitor, pc_store is first loaded with the memory origin of the program (eg !pc_store = em_mem) before emulate is called.

So, if you want to use the emulator outside the monitor, pc_store must hold the address of the instruction to be emulated. It is then incremented by the emulator as appropriate, depending on extension words, and so on.

It is then easy to have a REPEAT...UNTIL loop to execute a series of instructions. (You could try adding such a routine to the monitor yourself).

## Conclusion

This has all been hard work! You, also, will have to put in some work if you want to get the best out of the program and increase its 'emulatability'.

I'll be adding instructions until eventually the entire 68000 instruction set is at my mercy. Readers experimenting with the program are also invited to send in their efforts.

When the job is finally finished, I'll place the code in the public domain and then people can attempt to get Gem, Tos or perhaps even Amiga-Dos running on the Arc!

Remember the monitor is only a shell through which the emulator is accessed – ultimately it will not be needed.

## REFERENCES

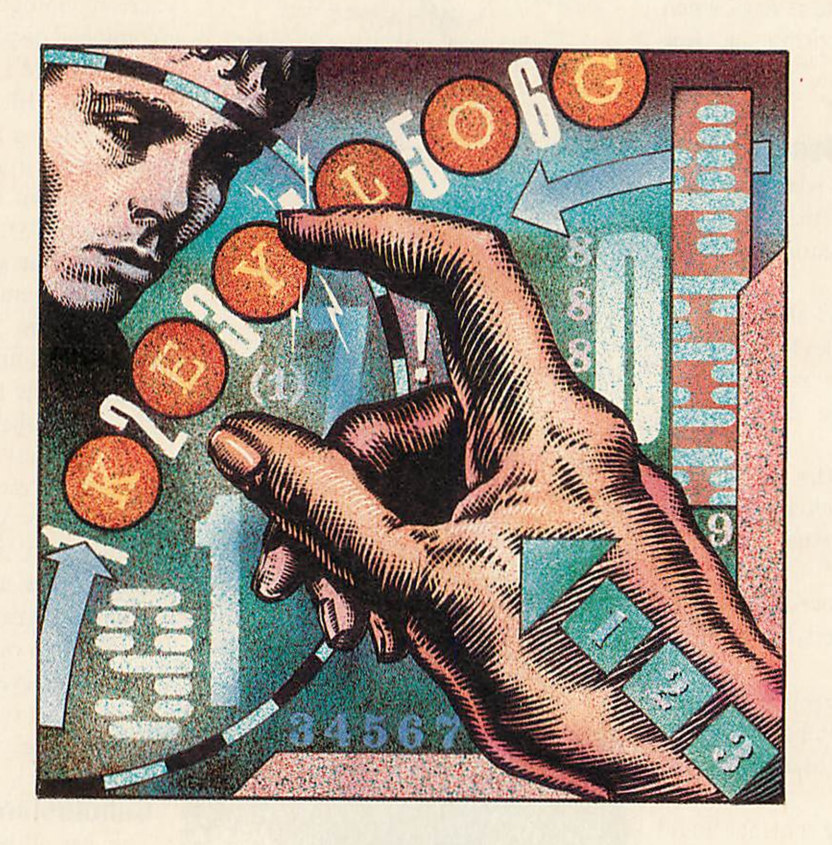
*ARM Assembly Language Programming* by Peter Cockerell. Published by MTC.

*Quick QL Machine Language* by Alan Giles. Published by Melbourne House.

*Advanced QL Machine Code* by Adam Denning. Published by Duckworth.

The second two concern the QL's 68008 and not the 68000 but the only difference is in the size of the physical data bus. The instructions and addressing modes are identical, as is everything else.

# EVERY STEP YOU TAKE




**Don't waste a moment, trace your moves on the keyboard and do your own time and motion studies**

*Peter Hunter*

Key-logging is the process of recording every keypress during a session at the computer. Some applications, on IBM PCs for example, use it as a method of back-up. If your machine fails, you can get the computer to re-trace your steps for you from the keylog file.

The first use I found for keylogging, however, was when carrying out some educational research into the use of word-processors by children.

The technique provides a means of recording all activity at the wordprocessor, including deletions and insertions.

In other words, it gave a much better picture of how a child composed a piece of writing than could be obtained from reading the finished product alone.

With sideways Ram, it is possible to store keylogged data out of the way of the foreground application.

ILLUSTRATION BY WILL HILL

The *Keylog* program in the yellow pages runs as a Rom image and does its logging in the background. It works with a large number of pieces of software, although there are some limitations, which we shall come to later.

One of the requirements, when researching computer activity, is not only to record the keys pressed but also when they are pressed. The time interval between keys has to be logged. *Keylog* does this, which means that it is able to replay what has happened at the computer keyboard in real time.

Because it works with a range of applications, *Keylog* could be used not only for researching the use of a wordprocessor but also, for example, to shed some light on how children go about editing some Logo procedures or what they do while interrogating a database.

When replaying, it is also possible to pause the flow of data, so *Keylog* can be useful for setting up a demonstration of a piece of software.

## Keylog in use

Type in the listing from the yellow pages. This assembles the code for the *Keylog* Rom image. Save the program before running it. When run, it will check the code after assembly and prompt you with an error message if its checksum does not work out as expected.

If all is well, the Rom image will be saved on disc as the file, KLrom. You will then be asked if you wish it to be installed in sideways Ram and if so, it will be loaded into Rom slot 4 and initialised ready for immediate use.

You can load the image yourself using *SRLOAD but you should note line 6530 should read, ?(&2A1+n)=&82, where n is your chosen Rom slot number.

Alternatively, create a working disc by copying KLrom to it and adding a !BOOT file:

```
1 *BASIC
2 *SRLOAD KLrom 8000 4 Q
3 ?&2A5=&82
```

After *OPT 4,3 the working disc can be booted with SHIFT-BREAK.

*Keylog* responds to three star commands:

*KLON – switches key logging on. After this, every key press is recorded. This will continue, even after pressing BREAK or CTRL-BREAK, until you switch *Keylog* off again.

*KLOFF switches key logging off. If you are not logging it will give rise to a 'Bad command' error. When key logging is switched off, the logged data will immediately be saved to disc, so have a disc ready. It will be saved as the file, KeyLog1 in the current directory on the currently selected drive.

*KLPLAY starts the replay of the logged keys. You must have the disc containing KeyLog1 in the drive so data can be loaded. The replay will be in real time. If you wish to pause the replay, press the space bar. Press RETURN to re-start after a pause. Press BREAK if you wish to stop a replay permanently.

When replaying, the *Keylog* program can emulate most keys but cannot reproduce BREAK or CTRL-BREAK by itself. Therefore, if either of these occurred during the logged session, then the words 'BREAK' or 'CTRL+BREAK' will appear at the top left corner of the screen (or current text window) during the replay.

These messages are prompts for either BREAK or CTRL-BREAK to be pressed, after which the replay will automatically resume. Pressing BREAK in these circumstances will not cause the replay to halt permanently.

Once you have installed *Keylog,* it is worthwhile experimenting with it. Try typing *KLON, followed by a few things at the Basic prompt. Then, with a disc in the drive, *KLOFF and *KLPLAY. You can then check that your key-presses are replayed correctly.

After this, begin trying out other applications. *Keylog* can be started any time – before you enter an application, or after, if it has access to star commands.

*Keylog* will record over 5,000 keypresses and the intervals between them before it runs out of data storage space – sufficient for many needs. If it does run out of room, it will automatically save KeyLog1 on disc and begin again on KeyLog2 and later KeyLog3 and so on. So, it is best to have a disc, with sufficient space on it, in the drive all the time. On replay, these datafiles will automatically be chained back in again.

If you begin a second key logging session, the first KeyLog1 file will be overwritten. To preserve it, either change the disc or rename it. Before replaying a renamed file, you must rename it back again to KeyLog1 (or KeyLog2, etc).

## Limitations

There are one or two things to beware of when replaying a *Keylog* file. Firstly, be prepared with the right disc in the drive at the right time. If the disc was changed during logging, then the same discs must be changed at the appropriate moment in the replay. Likewise, any peripheral (such as a printer) should be connected if the original session is to be replicated faithfully.

Also, beware that what is typed in the original session does not do any damage during the replay. For instance, *FORM40 or *DESTROY would be dumbly reproduced second time around!

What *Keylog* attempts to do, running in the background of other computer activity, is always bound to be a slightly risky business. So don't be surprised if it is not totally foolproof.

Since *Keylog* works by intercepting characters as they enter the keyboard buffer during logging and inserting characters in the keyboard buffer when replaying. It will have difficulties in the following circumstances:

- With software which scans the keyboard directly – which bypass the keyboard buffer. Games, for example, often adopt such an approach in order to achieve the maximum possible speed of operation and responsiveness.
- Those key presses (CTRL or SHIFT alone) which do not cause characters to be entered into the keyboard buffer will not be logged. Of course, such keys used in combination will still result in the appropriate character being generated and logged as normal.
- Software which alters the system clock (such as Basic programs which reset TIME), or the system's interval timing, will upset *Keylog*'s timing.
- Software which disables events or substitutes alternative event-handling will prevent *Keylog* from working.
- Intervals between key-presses greater than, approximately, 10 minutes (655.36 seconds, to be precise) will always be recorded incorrectly.

You may well discover other limitations not mentioned here!

## How Keylog works

The *Keylog* code runs in sideways Ram and the data generated is stored in the same sideways Ram as the code itself. It will only work on the Master range of computers because it uses some 65C12 specific instructions and it makes the machine code equivalent of *SRSAVE and *SRLOAD calls. Were it not for these two reasons, it could probably be made to work on a model B sideways Ram.

The Rom responds to star commands in the normal way but also keeps an eye on all presses of the BREAK key in case logging or replaying is active, in which case it needs to take some action.

Interception of keypresses is achieved by using events 2 (character entering buffer) and 6 (ESCAPE condition generated). The default event vector is replaced by one pointing into the *Keylog* Rom. The system clock is read and reset at each keypress to provide the time elapsed between each input.

Replaying also uses events. This time it is event 5 (interval timer crossing zero). The interval timer is set up from the logged data. Once it times out, the next key is inserted in the keyboard buffer and the timer is set to the next time interval.

Event 4 (vertical sync) is also used on replay, providing a pulse for scans of the keyboard to see if the space bar is depressed, in which case a pause is flagged.

When replaying, if BREAK or CTRL-BREAK are signalled, the code enters an infinite loop, waiting for either of those to be reproduced at the keyboard. Once this happens, it is picked up again by *Keylog* when the system reset is offered around all the Roms.

Since *Keylog* has to run in the background, it must make sure it doesn't tread on any memory used by the foreground application. Apart from its own Rom slot, nothing else is guaranteed to be available so all *Keylog*'s interval flags, counters, pointers and what have you are saved within sideways Ram. If any other memory is used, this must be temporary and must be left as found. So, zero page locations are saved on the stack before being used by *Keylog* (for *SRSAVE and *SRLOAD) and then restored afterwards.

# HENCEFORTH

**This month we're in complete control with the latest in our series on programming languages**

*Neil Sykes*

Although differing widely in their approach, languages such as Basic, Pascal and C all share the same underlying principle – that is the execution of a list of statements more or less in order. This month's language, Forth, is something of a departure.

Forth is based around two structures, the 'stack' and the 'vocabulary'. If you know any machine code, you will probably be familiar with the idea of a stack. This is simply a list of objects and you normally have access only to the last item entered – the 'top' of the stack.

Forth uses a stack for all its calculations. Operators, such as + or * use the top two or more items from the stack. For example, the immediate statement:

```
PRINT 2+5
```

in Basic would be written in Forth as:

```
2 5 + .
```

What this means is 'Put 2 on the stack. Put 5 on the stack. Now use the operator + to add together the top two numbers'. At this stage the stack will have only one number (the answer – 7) on it. The operator . is used to print the value.

This backwards working extends to other areas of the language. Basic's FOR..NEXT loop:

```
100 FOR X = 0 TO 100
200 ...
200 NEXT X
```

ends up in Forth as:

```
100 0 DO
...
LOOP
```

This way of working is called 'Reverse Polish Notation'. Its advantages are certainly not apparent in this example but more complicated calculations show it to have some useful side-effects. For example, in the expression:



ILLUSTRATION BY TOMMY YAMAHA

```
(4 + 3) * 5
```

the brackets are necessary to make the addition happen before multiplication, which takes priority. In Forth, priority is inherent in the language. You just write:

```
4 3 + 5 *
```

and each operator works only the last pair of numbers put on the stack.

Forth has a large number of operations which deal with the stack. The SWAP operation interchanges the top two items. DUP duplicates the top item and PICK can be used to extract an item from lower down the stack.

In general, though, Forth programmers tend not to venture beyond the top two or three items, as doing so throws away some of the speed which is one of the language's strengths.

Most code tends to have arguments left on top of the stack for it, and leaves its arguments there also.

This greatly reduces the need for variables in Forth. A parallel with assembler can be drawn here – just as using the processor's stack:

```
PHA
```

saves you having to allocate a memory location:

```
STA &70
```

Forth is used like this most of the time. However, in Forth there are variables although it does not possess the many and varied types of Pascal, C, or even Basic. To use a variable you write:

```
VARIABLE X
```

This reserves two bytes in memory (two-byte integers are the usual type of variable to be found in Forth). When the Forth word X is subsequently typed, the result is to leave the address of the variable

on the top of the stack.

The value of the variable has to be accessed using @ (to read) or ! (to write). For example:

```
X @ .
```

will print the value of X, while

```
5 X !
```

sets X to 5. This accessing of variables via their addresses is reminiscent of the pointers we saw in C and BCPL last month. While it provides a great deal of opportunity for clever programming, it means you must be very careful to avoid writing to something which is not actually a variable.

Forth provides very little error checking, and will happily allow you to get yourself into all sorts of trouble. It is important when programming in Forth to have a clear idea of what is going to be on the stack at all stages, so writing out the program and tracing it through before running it is vital.

You cannot use the Basic approach of banging away at the keyboard, performing alternate RUNs and modifications until it all starts working.

So far we have only looked at specific operations and calculations within Forth. To see how these are put to use, we turn to the other structure mentioned above – the vocabulary.

The vocabulary is the list of all the 'words' known to Forth. It can be read by typing VLIST and, when Forth is first entered, will largely contain simple 'words' such as + and −. Programming in Forth is done by extending the vocabulary to include new words of your own. For example:

```
: SQUARE DUP * ;
```

Here, the colon is used to indicate that a word is to be defined. The word itself, SQUARE, is then followed by the actions needed to carry it out.

These must be written in terms of words which have already been defined. In this case, these are DUP, which duplicates the item at the top of the stack, and *, which multiplies the top two items leaving the result at the top (thus producing the square digit of the original item).

In fact, there is no equivalent of the Basic 'program' in Forth. I suppose the nearest equivalent would be a procedure definition. The idea is to split the program up into simple tasks, assigning each of these to a particular word.

A collection of words, usually called an 'application' can then be loaded on top of the system vocabulary for each application.

Effectively, you are creating your own language or 'shell'.

Forth also provides the facility to create more complicated structures, using two system words CREATE and DOES>. For example, this is how you would set up an array:

```
: ARRAY CREATE 2* ALLOT
        DOES> SWAP 2* + ;
```

This defines the word ARRAY to be itself a a defining word, used as follows:

```
5 ARRAY A
```

equivalent to:

```
DIM A(5)
```

in Basic. The words after CREATE in the definition above indicate the actions taken when the word ARRAY is used (allocating space for the required number of two-byte integers), while those after DOES> determine what happens when a word defined by ARRAY (in this case A) is executed (here, accessing the value of the required array element).

When a Forth word, such as the SQUARE above is defined, the instructions are compiled into the dictionary.

Unlike Basic, where you can LIST the program, in Forth the original text cannot be recovered.

This means you need to keep all your definitions separately in a text file. Forth systems usually provide an editor to allow this but any text editor could be used.

Having seen the amount of address arithmetic and store management involved just to define an array, you may feel that Forth is more like machine code than a high-level language.

In fact, in many ways Forth is more difficult to learn than assembler. You will need to get to grips with Reverse Polish Notation, stack management, and Forth's other quirks.

The minimal facilities of Forth, however, give it a large speed advantage over other languages on the BBC micro.

It is also true that languages such as C (reviewed last month), which were originally written for minicomputers with large amounts of memory and many machine registers, can never be quite as efficient on a small machine such as the humble BBC micro.

Forth is much more at home in this environment, especially when used for machine control applications – one of the BBC micro's great strengths.

Indeed, it is this application for which Forth has been widely used in industry. It is possible to purchase microprocessor control cards with a Forth interpreter fitted, since the language has modest memory requirements.

As with all the languages we have looked at, it is a matter of 'horses for courses'. I wouldn't want to write a large program such as a compiler or word-processor in Forth but where speed and economy are important it does have to be taken seriously.

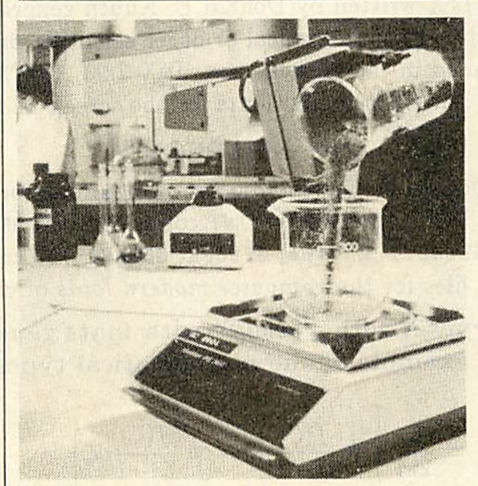
With Forth you could do much of the development for a 'foreign' microprocessor control system on your BBC micro. If this is the sort of work that interests you, then I reckon Forth is certainly worth a look.

## GETTING INTO FORTH

Forth is available as a 16K Rom for the BBC model B, Master, Compact and Electron computers. It can be bought from Acornsoft for £36.80. The Acorn manual, as well as describing the system, can be used to learn the language.

For the Archimedes, Silicon Vision produces RiscForth, a much more sophisticated implementation which includes floating-point routines. This costs £99.95.

Both packages go further than the relevant Forth standard (Forth-79 in the case of the BBC micro, Forth-83 for the Archimedes) in providing special support for the machines' graphics and operating systems.



**Forth controls the robot**

# THE PUBLISHER



## ODE to The PUBLISHER

(from the electronic pen of D McNeil)

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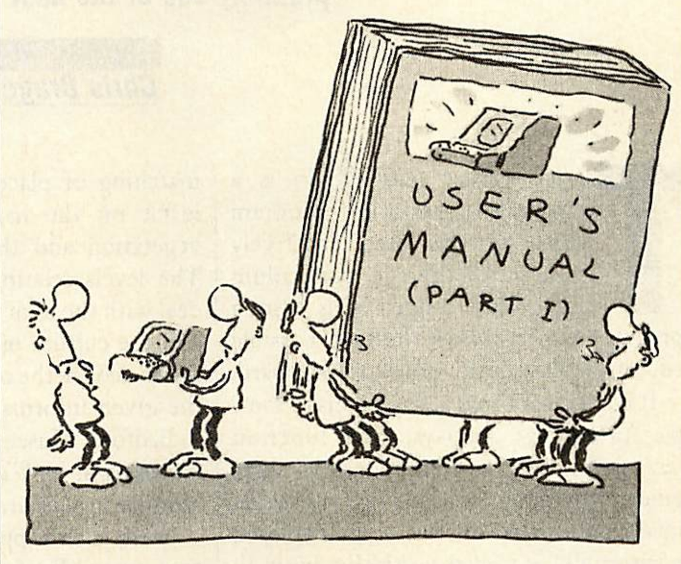
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# WORLD CLASS

**Bring previously unimaginable situations to life with the help of Touch Explorer Plus, probably one of the best educational packages around**

*Chris Drage and Nick Evans*

*Touch Explorer Plus* (*TEP*) is a remarkably versatile program which can be used effectively right across the age, curriculum and ability range. It is also a program which makes the best possible educational use of the Concept Keyboard.

It comprises three software discs, sample A4 and A3 overlays, three function key strips and a comprehensive user guide. At its simplest level, *TEP* allows an image on a paper overlay to be explored horizontally as well as vertically, in up to six layers of information.

Overlays can be pictures, maps, diagrams or text. Pressing an area of the overlay displays a message relevant to that area. The content of the overlay and the information provided by the overlay files is entirely up to the teacher. The potential of *TEP* was described in detail in *BBC Acorn User* September 1989. In this issue we examine some of the uses to which *TEP* is being put around the country.

An interesting application of *TEP* has been developed at Bedford Museum in conjunction with Bedfordshire Media Resource Service.

The museum lends schools a pack of artefacts and tasks known as the *World Box*. It contains a variety of articles with a common purpose but of design and materials appropriate to the culture, climate and physical environment of the people who use them. For example, there is a set of hats, a collection of shoes and a selection of containers from various parts of the world.

The *TEP* overlay comprises a set of colour photographs of some of the items round the edge. The middle is an unlabelled map of the world and the articles' places of origin are marked as dots. There are four levels to explore for each of the photographs and dots. One level on each has the name of the 'owner' of the item, so that children are able to confirm the matching of place and item. The other levels on the map deal with climate, vegetation and the country's economy. The levels relating to the photographs deal with the item's manufacture, purpose and the culture of the owner. The child has to deduce the origin of the items from the given information.

Bedford Museum, by including such materials in its *World Box*, is providing a stimulating, interactive resource.

With such support it is not surprising that several Bedfordshire schools are also putting *TEP* to good use in their humanities departments. Two in particular are using archaeological overlays as a specific source of information and as a trigger for research.

In a lower school an imaginary site has been created with six levels of time. Each level contains only brief statements like: 'Find 1: a Samian pot'. The children are then directed to artefacts, where the school has them, or to find information cards, with suggestions for research.

Similarly, another school is planning to use a map of Verulamium as a source of information for GCSE History Around Us, in the SHP syllabus. Through its history, the city was destroyed and rebuilt twice, had a major period of expansion and with the present day map of the site, six ideal *TEP* levels are represented.

In another Bedfordshire school, maps have been obtained of a Dunstable street for 1881, 1901 and 1924, along with census and yearbooks showing use and head of household for each of the years. An overlay has been made similar to the one in the *World Box* package, but in addition showing the decline of population as houses became uninhabited and were demolished.

The overlay ties in well with the set of plans for every building in the street, including the original Board School. This creates a complete study of the area.

NCET's Humanities and Information Technology (HIT) Project has spawned a number of very interesting applications of *TEP* in lower secondary schools. The IT Centre, Avon, reports the development of *TEP* materials spanning the Roman, Medieval and Victorian eras.

It was decided at the outset that because empathy has caused historians so much heartache over the last few years, the *TEP* files should help the effective teaching and subsequent assessment of this skill.

The Roman file, called *Corinium Visit*, is used as part of a first year humanities course. The overlay depicts a busy Roman street in a local town, two thousand years ago, and invites children to inquire further by pressing a part of the picture and obtaining information from the database. Six people on the overlay give six very different views of what is happening. In practice the children learn quickly to jump from one view to another, while looking at the different activities occurring in the picture.

Teachers assessing the value of *TEP* in this context have found that work 'on the picture' stimulates not only an appreciation of motive within the children but also encourages them to apply this skill.

*A Medieval Village* is the title of an overlay file through which children empathise with the experiences of the occupants of a medieval manor, including their status occupations and what life offered them. The overlay depicts an oblique aerial view of the manor and surrounding countryside. As the children explore the overlay, they are presented with a number of questions open for group discussion.

To record their findings, the children must complete a chart with headings like 'name', 'position', 'responsibilities' and 'what do they think of life and why'. Through this exploration the social struc-

ture of a medieval rural community is revealed and empathy is encouraged.

The Victorian overlay concentrates on the social conditions and attitudes prevalent in the early part of the 19th century and is entitled *Capital and Labour*.

At the most basic level, the overlay file provides information on working conditions and contrasts these with the lives of a mill owner and his family. At a higher level children are able to explore the attitudes of different social classes and are guided to the realisation that within any one social class there can be widely differing views.

The overlay file is sufficiently flexible in its content to be used for a variety of age groups; for example, with third years as part of a course on the Industrial Revolution, or with fourth and fifth years as part of the Schools Council GCSE course Britain 1815–51.

For busy teachers who like the concept of using *TEP*, yet feel they don't have the time to prepare overlays and overlay files, solace is at hand.

The Pictorial Charts Educational Trust is currently producing art work of the right proportions for use both as the centre piece of wall charts (like 'The Garden at Night' shown right) and for production as A3 Concept Keyboard overlays for use with *TEP*. More details from them at the address below.

Finally, what do the children themselves think of using Touch Explorer Plus overlay files in their work? From a group of bright third years and a group of mid-band second years who have actually worked with the *Capital and Labour* file, come the following comments: 'Using the Concept Keyboard is more interesting than usual school software'... 'first of all I didn't think much of it because nowadays everything is computerised, but when we began to play with it it was really good fun'... 'I think it is a very good idea having a computer that gives information about people just by pressing the board.'

Special thanks to Cathy Green (NCET), Isobel Randall (IT/humanities consultant teacher, Bedfordshire), Jayne Warburton (IT/humanities advisory teacher, Avon).

*Touch Explorer Plus* is available from Hoddle, Doyle and Meadows Ltd, Old Mead Road, Elsenham, Bishops Stortford, Hertfordshire CM22 6JN. The Pictorial Charts Educational Trust is at 27 Kirchen Road, London, W13 0UD.



# SPREAD SHEETS

**You'll never be afraid to tackle them again. We take the nastiness out of number crunching**

In the last issue I described a few of the typical applications with which spreadsheets can help. Now I would like to describe the main types of calculations which can be done, the related functions on offer like conversion to text and graphics, and finally a little about what is on the market today.

The simplest way to describe what they can do is to say that any calculation or series of them which can be written down on paper can just as easily be entered on a spreadsheet.

The method of making entries or instructing the micro to make the calculations varies slightly between spreadsheets but there is little difference between the actual orders they can accept. I will use the simplest and best known type of notation (+, −, * and / for the basic four rules) throughout.

In most ways spreadsheets behave like simple calculators and it is helpful to be able to set out chains of calculations using a calculator, such as 'take this number, double it, subtract 5, and divide the total by 7, showing the dividend to the nearest whole number'.

This is a simple chain calculation which could also be written in algebraic notation as follows:

```
((X * 2) - 5) / 7 = ?
```

to the nearest integer, and where x = 100.

The computer spreadsheet is happy to do it either way, depending on whether you want to see the intermediate steps or not. In the first case you can see everything while in the second it can be entered into a single line.

Apart from the four basic rules there are many more functions available to the user. All the trignometrical tables are available by typing in SIN, COS, TAN while constants like PI, the Exponential e and logs to various bases can be used.

Some other frequently used standard processes are included of which square and square roots are the most obvious, while the powers and roots generally can be set up very easily.

Not only that but the BBC micro can work to more figures than most calculators. Depending on the spreadsheet used you are likely to be able to use up to about 15 figures with accuracy in computation up to at least 12 – which is very much more than most pocket calculators.

If you think about the potential for errors when you work in so many large numbers, it is obvious that the spreadsheet is very useful for anyone who frequently does such calculations.



Viewsheet – one of the older packages

It goes without saying that it will apply any of these functions to all kinds of numerical data and allow you to set up tables or any other type of presentation of data you wish.

Take for example a standard trading account and balance sheet: each year the format for presentation is much the same; only the individual figures change and they are related to each other in the same way. It follows that you can set them up once and present them the same way each year with a minimum of thought.

It is also easy to set instructions in any square to show a chosen number of decimal places: if you are working in pounds then you want £125.12 and not £125.12567 so you set it to two decimal places (or none, or 10).

How you move around the spreadsheet varies a little but in general you can move from cell to cell or jump in groups, typically moving 10 rows or columns at a time. All the rest is in the way you can manipulate the appearance of the layout, and then print it.

The ability to move entries about the sheet by either transferring or replicating (copying) is very important, as is the power to change the shape of cells from one width to another.

If your standard cell is eight characters wide and you want 'BBC Computer' to appear in full in a space, then you need to be able to extend it to at least 12 characters. Some sheets allow you to write across several cells.

Among other kinds of presentation, you will find the ability to choose between the mathematical or commercial negatives – writing −1250 or (1250) – and the old chestnut of how to get a pound sign printed right. These and many more instructions are available on all spreadsheets, and very often in the form of /p for print or /£ for pounds.

There are two special commands which are very useful. These are IF statements (referred to in the previous article) and LOOKUP. The first is used when you want to make a conditional statement. Suppose, in a table, you want to charge 10 per cent profit on wholesale prices of £20 and over with 15 per cent under that. You create a column for mark-ups alongside the prices and type in:

```
IF(A2<20,15,10)
```

The column A will hold the wholesale

prices, and another, perhaps C will hold the marked-up price.

LOOKUP is even more subtle, although I confess I do not often have to use it. Using a similar example but with a series of different ranges and percentage mark-ups, you set up a table on the sheet, probably far out of sight and enter the command:

```
LOOKUP(A2,B10B20,C10C20)
```

Suppose column A contains a list of car makes, and A2 contains 'FORD' then the computer looks in the area B10B20 until it finds the word 'FORD' and prints in the cell from which the command was given the contents of the corresponding cell in C10C20 which might be the delivery charge: it sounds complicated but it isn't.

The possibilities are immense and it becomes an obsession to present any kind of data more and more imaginatively but there are other things which you can do with the material.

Perhaps most useful of all is the ability to spool out sections of the data into a wordprocessor to present the key information in a table accurately and without the risk of striking the wrong key in copying it out.

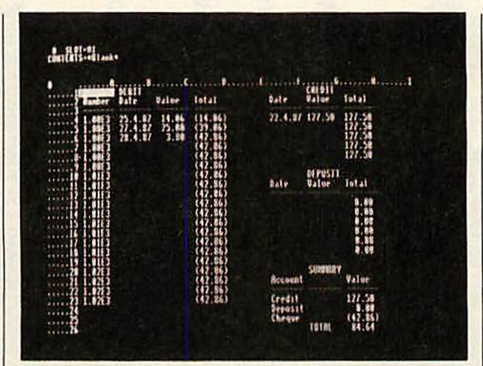
Other varieties of presentation are also possible by using the ability to transfer data to charts to produce graphs of all kinds. This allows you to give graphic representation to a report quickly and easily. It also helps to be able to display them in colour if required.

This calls for integration between software packages and most spreadsheets now are part of families of business software which use the sheets for processing data either inserted direct or drawn from a database.

The publishers of the software will not like me saying it, but there are no very great differences between the products since the main features of spreadsheets were set over 20 years ago and are very hard to improve on.

There are variations in the ease with which data is entered. For example, some require you to indicate with each numerical item whether it is a label or a number, and if the latter whether it is positive (+) or negative (−).

The other main difference has very little to do with the spreadsheet itself but rather with the range and quality of the related software with which it integrates and how easy you find them to use.



**Viewsheet – a popular choice**

**Intersheet – also an excellent package**

If only because the original design of spreadsheets was so good, very few new ones have been published for some time and several have disappeared from the market like *Ultracalc 2*.

This vanished largely because it did not belong to a family, offering the full range of links, and although it could merge with most wordprocessors and had its own graphic utilities, it still became unattractive to buyers in the restricted market for these facilities.

Similarly several disc based systems like *PRACTICALC 2* which were quite adequate in themselves have gone, presumably for the same reason.

That leaves only six readily available and three of these are fully integrated packages with a full range of support: *Mini Office II* (Database Software, £14 plus VAT for the disc version and £48 for the Rom), *Viewsheet* (Acornsoft, £36) and *Intersheet* (Computer Concepts, from £38). The prices given are very much a guide since there is a wide variety of different offers available.

*Mini Office* is cheap and works well although it is rather unsophisticated. If you like the wordprocessor in the series, then the spreadsheet is sufficient for most uses. I would not choose it for everyday service, but given the price it represent good value for money.

Deciding between *Viewsheet* and the newer *Intersheet* is more difficult, unless you use the corresponding wordprocessor or database, in which case you have no real choice.

Both are excellent and do almost exactly the same job. I have a small preference for the *Inter* series mainly because I like *Interchart* very much, preferring it to the corresponding *Viewplot* but I probably prefer the *View* wordprocessor to *Interword.*

The others are each different in their own way, and first is the *Sigma* Spreadsheet (Minerva, £69.95). Its lack of being in an integrated series counts against it. The other products from Minerva are very good but the company is perhaps more at home with databases and simply producing the independent module is not very promising.

The remaining choices are *Pipedream* (£89) and *Logistix* (Acornsoft, £99) which are quite different from the others in many ways and require the Archimedes to run them. They are very much more sophisticated packages.

*Pipedream* claims to be a wordprocessor with spreadsheet facilities. While this is technically correct, I cannot imagine anyone wanting to use it in that way: it makes much more sense to think of it as very suitable for producing lengthy and complicated numerical data interspersed with descriptive text.

I like it but you would need to have some knowledge of both facilities, be quite clear about the type of job you want it to do, and then see a demonstration.

*Logistix*, I like very much indeed and I would strongly recommend it for someone using an Archimedes who frequently makes numerical reports, since it offers a combination of spreadsheet, timesheet (with some help from the Arc clock) and database. It also has excellent graphic capabilities, using the full range of colour, all in one.

This is not the place for a review but read one and marvel at what it can do.

The conclusion is that there are numerous applications for spreadsheets and not many on the market for you to choose from at present.

The choice you make almost certainly depends on whatever package integrates best with your other software. And you must be sure it actually can perform the tasks you are likely to require.

The last word must be: do not be afraid of spreadsheets. They are all easy to use and fun to work with, whatever you need them to do.

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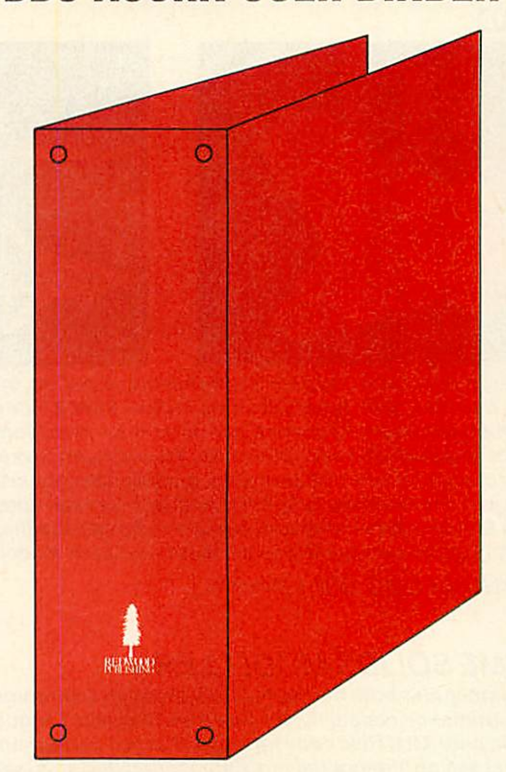
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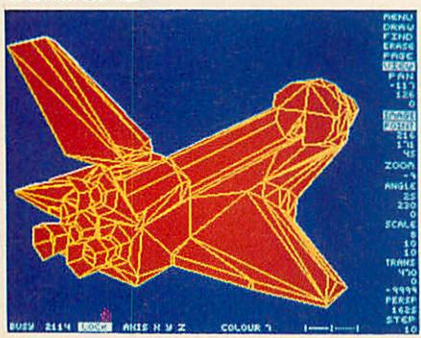
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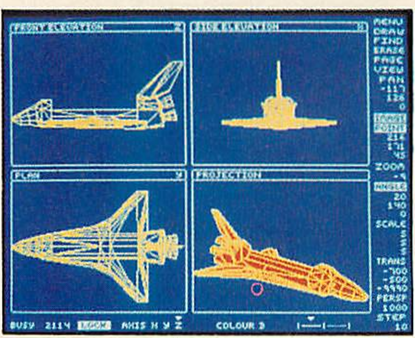
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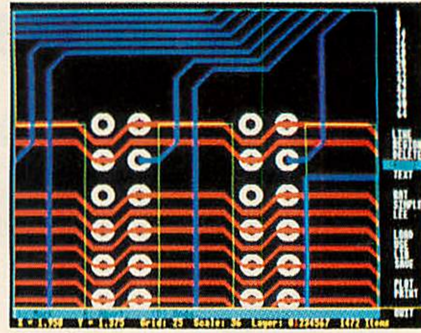
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| Program | Page | BBC B | B+/128 | Master 128 | Master Compact | Electron | Arc | 6502SP/ Turbo | ADFS | Econet | Shadow RAM | Monthly Disc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arc Agora | 97 | | | | | | | | | | | |
| Listings 1-5 | | | | | | | ■ | | ■ | ■ | ■ | ■ |
| Hints & Tips | 98 | | | | | | | | | | | |
| Listing 1 | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ |
| Listing 2 | | | | ■ | | | | ■ | ■ | ■ | ■ | ■ |
| Listing 3(1) | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ |
| Listing 4 | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Interlude | 99 | | | | | | | | | | | |
| Listing 1 | | ■ | ■ | ■ | ■ | | | | ■ | ■ | ■ | ■ |
| Stitched Up | 100 | | | | | | | | | | | |
| Listing 1 | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ |
| Copy Cats | 101 | | | | | | | | | | | |
| Listing 1 | | | | | | | ■ | | ■ | ■ | ■ | ■ |
| Every Step You Take | 104 | | | | | | | | | | | |
| Listing 1 | | | | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ |

Note. 1. Requires Basic II.

## ARC AGORA

See Arc Agora, page 30

### Listing 1.

```
10 REM >Squiggly
20 REM Agora - listing 1
30 REM by Stuart Cupit
40 REM for Archimedes only
50 REM (c) BAU December 1989
60 :
70 size=2^13
80 density=8
90 accuracy=20
100 DIM rnd size,vdu_variables 8
110 DIM stack &14000*4
120 DIM code% 1000
130 PROCass
140 REPEAT
150 MODE 3:OFF
160 PRINT TAB(10,10)"Random? (Y/N
)"
170 key$=GET$
180 CLS
190 IF key$="Y" OR key$="y" THEN
200 FOR loop=1 TO size
210 ?(rnd+loop)=RND(4)
220 NEXT loop
230 mem=size
240 ELSE
250 PROCuserdef
260 ENDIF
270 IF mem>256 mem=(mem DIV 4)*4
280 IF accuracy>mem accuracy=mem
290 MODE 13:OFF
300 GCOL 0 TINT 64
310 RECTANGLE 0,0,1279,1023
320 !(vdu_variables)=149
330 !(vdu_variables+4)=-1
340 SYS"OS_ReadVduVariables",vdu_
variables,vdu_variables
350 !(info)=!(vdu_variables)
360 !(info+4)=rnd
370 !(info+8)=stack
380 !(info+12)=320
390 !(info+16)=0
400 !(info+20)=mem
410 A%=RND(!(info+12))
420 B%=RND(256)
430 CALL flood
440 *FX 15,1
450 key$=GET$
460 UNTIL FALSE
470 :
480 DEF PROCass
490 FOR pass%=0 TO 2 STEP 2
500 P%=code%
510 [OPT pass%
520 .flood
530 STMFD R13!,{R14}
540 ADR R12,info
550 LDR R11,[R12]
560 LDR R10,[R12,#4]
570 LDR R9,[R12,#8]
580 LDR R8,[R12,#12]
590 MOV R6,#0
600 .fill_loop
610 MLA R7,R8,R1,R11
620 MOV R2,R6,ASR #density
630 AND R2,R2,#255
640 CMP R2,#0
650 MOVEQ R2,#1
660 STRB R2,[R7,R0]
670 MOV R5,#0
680 .boxed_loop
690 ADD R5,R5,#1
700 CMP R5,#accuracy
710 BGE deadend
720 MOV R3,R0
730 MOV R4,R1
740 LDR R2,[R12,#16]
750 LDR R7,[R12,#20]
760 ADD R2,R2,#1
770 CMP R2,R7
780 MOVGT R2,#0
790 STR R2,[R12,#16]
800 LDRB R2,[R10,R2]
810 CMP R2,#1
820 ADDEQ R3,R3,#1
830 CMP R2,#2
840 SUBEQ R3,R3,#1
850 CMP R2,#3
860 SUBEQ R4,R4,#1
870 CMP R2,#4
880 ADDEQ R4,R4,#1
890 MLA R7,R8,R4,R11
900 LDRB R2,[R7,R3]
910 CMP R2,#0
920 BNE boxed_loop
930 MOV R0,R3
940 MOV R1,R4
950 ADD R2,R0,R1,LSL #12
960 STR R2,[R9,R6]
970 ADD R6,R6,#4
980 B fill_loop
990 .deadend
1000 SUB R6,R6,#4
1010 LDR R2,[R9,R6]
1020 MOV R0,R2,LSL #20
1030 MOV R0,R0,LSR #20
1040 MOV R1,R2,LSR #12
1050 CMP R6,#0
1060 BGT fill_loop
1070 LDMFD R13!,{PC}
1080 .info
1090 EQUD 0:EQUD 0:EQUD 0
1100 EQUD 0:EQUD 0:EQUD 0
1110 ]
1120 NEXT pass%
1130 ENDPROC
1140 :
1150 DEF PROCuserdef
1160 *FX 15,1
1170 FOR loop=1 TO 40
1180 WAIT
1190 NEXT loop
1200 MODE 1:OFF
1210 mem=0
1220 *POINTER
1230 MOUSE xx,yy,b
1240 xx=xx DIV 4
1250 yy=yy DIV 4
1260 MOUSE x,y,b
1270 IF INKEY(-99) ENDPROC
1280 IF b=0 GOTO 1230
1290 PRINT TAB(0,0) mem
1300 IF b<>0 POINT xx*4,yy*4
1310 IF x DIV 4<>xx OR y DIV 4<>yy
ELSE GOTO 1260
1320 x=x DIV 4
1330 y=y DIV 4
1340 IF x>xx xx+=1:v=1:GOTO 1380
1350 IF x<xx xx-=1:v=2:GOTO 1380
1360 IF y>yy yy+=1:v=3:GOTO 1380
1370 IF y<yy yy-=1:v=4:GOTO 1380
1380 ?(rnd+mem)=v
1390 mem+=1
1400 IF mem>size ENDPROC
1410 GOTO 1260
```

### Listing 2.

```
10 REM >MakeDat
20 REM Agora - listing 2
30 REM by Dave Acton
40 REM for Archimedes only
50 REM (c) BAU December 1989
60 :
70 DIM q% &100,code% &200
80 CLOSE#0
90 PROCass
100 free%=(HIMEM-END-&8000) AND &
FFFFF000
110 DIM w% free%
120 PROCins("Dat")
130 INPUT"Enter DATA filename: "d
ata$
140 dataout%=OPENOUT(data$)
150 PROCins("$.!")
160 INPUT"Enter source directory:
"app$
170 dataline%=1000
180 n%=0
190 PROCd(app$)
200 PROCins("Y")
210 auto%=FNyn("Select files auto
matically")
220 WHILE n%>=0
230 SYS "OS_GBPB",10,app$,q%,1,n%
,&100,"*" TO ,,,read%,n%
240 IF read%=1 THEN
250 isafile%=(q%!&10=1)
260 i%=&14
270 WHILE q%?i%<>0
280 i%+=1
290 ENDWHILE
300 q%?i%=13
310 type%=(!q% AND &FFFFFF00)>>>8
320 name$=$(q%+&14)
330 rightsort%=NOT (type%=&FFFFFB
OR FNuc(name$)="!RUNIMAGE")
340 IF auto% THEN
350 include%=rightsort%
360 IF include% PRINT"Including '
"name$"'"
370 ELSE
380 IF rightsort% PROCins("Y") EL
SE PROCins("N")
390 include%=FNyn("Include '"+nam
e$+"'")
400 ENDIF
410 IF include% THEN
420 PROCd(""""+name$+"""")
430 PROCd(FNhex(!q%)+","+FNhex(q%
!4))
440 PROCd(FNhex(q%!8)+","+FNhex(q
%!12))
450 SYS "OS_File",255,app$+"."+na
me$,w% TO ,,,,olen%
460 IF olen%>0 THEN
470 A%=w%
```

Continued ▶

◀ Continued

```
480 B%=w%+olen%
490 C%=w%+olen%+1
500 clen%=USR(compact)
510 dt$=""
520 chk%=0
530 FOR i%=0 TO clen%-1
540 PROCadd(i%?C%)
550 NEXT
560 IF dt$<>"" PROCd(dt$+","+STR$
(chk% MOD 100))
570 ENDIF
580 ENDIF
590 ENDIF
600 ENDWHILE
610 PROCd("*")
620 CLOSE#dataout%
630 PRINT'"Process complete"
640 END
650 :
660 DEF FNyn(q$)
670 LOCAL yn%,yn$
680 REPEAT
690 PRINT q$"? ";
700 INPUT""yn$
710 yn%=INSTR(" YyNn",LEFT$(yn$,1
)) DIV 2
720 UNTIL yn%>0
730 =(yn%=1)
740 :
750 DEF FNuc(u$)
760 LOCAL i%,v$,m%
770 FOR i%=1 TO LEN(u$)
780 m%=ASC(MID$(u$,i%))
790 IF m%>=ASC"a" AND m%<=ASC"z"
m%-=32
800 v$+=CHR$(m%)
810 NEXT
820 =v$
830 :
840 DEF PROCadd(v%)
850 dt$+=RIGHT$("0"+STR$~v%,2)
860 chk%+=v%
870 IF LEN(dt$)>=21 THEN
880 PROCd(dt$+","+STR$(chk% MOD 1
00))
890 dt$=""
900 chk%=0
910 ENDIF
920 ENDPROC
930 :
940 DEF PROCins(i$)
950 LOCAL i%
960 FOR i%=1 TO LEN(i$)
970 SYS "OS_Byte",138,0,ASC(MID$(
i$,i%))
980 NEXT
990 ENDPROC
1000 :
1010 DEF PROCd(d$)
1020 BPUT#dataout%,STR$(dataline%)
+"DATA "+d$
1030 dataline%+=1
1040 ENDPROC
1050 :
1060 DEF FNhex(h%)="&"+STR$~h%
1070 :
1080 DEF PROCass
1090 start=0:end=1:dest=2:destend=
3
1100 read=4:byte=5:compaddr=6:long
est=7
1110 byte2=8:read2=9:compaddr2=10:
bestaddr=11
1120 word=12:sp=13:link=14:pc=15
1130 FOR pass%=0 TO 2 STEP 2
1140 P%=code%
1150 [OPT pass%
1160 .compact
1170 STMFD (sp)!,{dest}
1180 SUB destend,end,start
1190 ADD destend,dest,destend
1200 MOV read,start
1210 .countloop
1220 CMP dest,destend
1230 BGT finishedcomp
1240 CMP read,end
1250 BGE finishedcomp
1260 MOV longest,#0
1270 SUB compaddr,read,#255
1280 CMP compaddr,start
1290 MOVLT compaddr,start
1300 .compareloop1
1310 LDRB byte,[read]
1320 .findfirst
1330 LDRB byte2,[compaddr],#1
1340 CMP byte,byte2
1350 BNE findfirst
1360 CMP compaddr,read
1370 BGE donecomp
1380 MOV compaddr2,compaddr
1390 ADD read2,read,#1
1400 .compareloop2
1410 CMP read2,end
1420 BGE notsame
1430 CMP compaddr2,read
1440 BGE notsame
1450 LDRB byte,[read2],#1
1460 LDRB byte2,[compaddr2],#1
1470 CMP byte,byte2
1480 BEQ compareloop2
1490 .notsame
1500 SUB read2,read2,read
1510 SUB read2,read2,#1
1520 CMP read2,longest
1530 MOVGT longest,read2
1540 SUBGT bestaddr,compaddr,#1
1550 B compareloop1
1560 .donecomp
1570 CMP longest,#3
1580 BLT nohope
1590 CMP longest,#34
1600 MOVGT longest,#34
1610 ADD byte2,longest,#128
1620 STRB byte2,[dest],#1
1630 SUB byte2,read,bestaddr
1640 STRB byte2,[dest],#1
1650 ADD read,read,longest
1660 B countloop
1670 .nohope
1680 LDRB byte,[read],#1
1690 CMP byte,#130
1700 BLT notspec
1710 CMP byte,#162
1720 BGT notspec
1730 MOV byte2,#130
1740 STRB byte2,[dest],#1
1750 .notspec
1760 STRB byte,[dest],#1
1770 B countloop
1780 .finishedcomp
1790 LDMFD (sp)!,{byte}
1800 SUB R0,dest,byte
1810 MOV pc,link
1820 ]
1830 NEXT pass%
1840 ENDPROC
```

## Listing 3.

```
10 REM >MakeApp
20 REM Agora - listing 3
30 REM by Dave Acton
40 REM for Archimedes only
50 REM (c) BAU December 1989
60 :
70 free%=(HIMEM-END-&8000) AND &
FFFFF000
80 DIM w% free%
90 READ app$
100 REPEAT
110 PROCins(app$)
120 INPUT"Enter destination direc
tory: "app$
130 IF app$="" app$="@"
140 SYS "XOS_File",5,app$ TO type
%
150 UNTIL type%=2
160 REPEAT
170 READ file$
180 IF file$<>"*" THEN
190 file$=app$+"."+file$
200 PRINT"Creating file """file$"
"""
210 READ load%,exec%,olen%,attrib
%
220 p%=0
230 d$=""
240 dl%=1
250 WHILE p%<olen%
260 b%=FNb
270 IF b%=130:p%?w%=FNb:p%+=1
280 IF b%>=131 AND b%<=162 THEN
290 n%=b%-128
300 f%=p%-FNb
310 FOR i%=0 TO n%-1
320 ?(w%+p%+i%)=?(w%+f%+i%)
330 NEXT
340 p%+=n%
350 ENDIF
360 IF b%<130 OR b%>162 THEN
370 p%?w%=b%:p%+=1
380 ENDIF
390 ENDWHILE
400 SYS "OS_File",0,file$,,,w%,w%
+p%
410 SYS "OS_File",1,file$,load%,e
xec%,,attrib%
420 ENDIF
430 UNTIL file$="*"
440 PRINT'"Files created"
450 END
460 :
470 DEF FNb
480 LOCAL b%,c1%,c2%,i%
490 IF d$="" THEN
500 READ d$,c1%
510 c2%=0
520 FOR i%=1 TO LEN(d$)/2
530 c2%+=EVAL("&"+MID$(d$,2*i%-1,
2))
540 NEXT
550 IF c1%<>(c2% MOD 100) PRINT"E
rror in DATA line ";dl%:END
560 dl%+=1
570 ENDIF
580 b%=EVAL("&"+LEFT$(d$,2))
590 d$=MID$(d$,3)
600 =b%
610 :
620 DEF PROCins(i$)
630 LOCAL i%
640 FOR i%=1 TO LEN(i$)
650 SYS "OS_Byte",138,0,ASC(MID$(
i$,i%))
660 NEXT
670 ENDPROC
680 :
```

## listing 4.

```
10 MODE12:VDU14:A%=&3FFFD44:REPE
AT:B%=?A%:IFB%<>&A THEN VDU B%:A%+=
1:UNTIL A%=&3FFFFF6 ELSE PRINT:A%+=
1:UNTIL FALSE
```

## Listing 5.

```
10 REM >WimpSprite
20 REM Agora - listing 5
30 REM by Dave Acton
40 REM for Archimedes only
50 REM (c) BAU December 1989
60 :
70 MODE 12
80 DIM p% &100,scale% 16,ctab% &
100
90 !scale%=640
100 scale%!4=256
110 SYS "Wimp_ReadPalette",,p%
120 FOR c%=0 TO 15
130 COLOUR c%,p%?(c%*4+1),p%?(c%*
4+2),p%?(c%*4+3)
140 NEXT
150 VDU 5
160 x%=0
170 y%=1024-128
180 SYS "Wimp_BaseOfSprites" TO b
ase1%,base2%
190 PROClist(base1%)
200 PROClist(base2%)
210 PROCwait
220 VDU 4
230 END
240 :
250 DEF PROClist(base%)
260 num%=base%!4
270 IF num%>0 THEN
280 ptr%=base%!8
290 FOR i%=0 TO num%-1
300 b%=base%+ptr%
310 j%=b%+4
320 n$=""
330 WHILE ?j%>=32
340 n$+=CHR$(?j%)
350 j%+=1
360 ENDWHILE
370 MOVE x%,y%+32
380 PRINTn$;
390 IF base%=base1% PRINT" (R)"
400 SYS "Wimp_ReadPixTrans",256+4
0,base%,n$,,,,scale%,ctab%
410 SYS "OS_SpriteOp",256+52,base
%,n$,x%,y%+40,8,scale%,ctab%
420 ptr%+=!b%
430 x%+=256
440 IF x%=1280 THEN
450 x%=0
460 y%-=128
470 IF y%=128 PROCwait
480 ENDIF
490 NEXT
500 ENDIF
510 ENDPROC
520 :
530 DEF PROCwait
540 MOVE 0,32
550 PRINT"Press a key..."
560 wait=GET
570 CLG
580 x%=0
590 y%=1024-128
600 ENDPROC
```

See Hints & Tips, page 33

## Listing 1.

```
10 REM Whole DFS disc to ADFS
20 REM by Joe Abley
30 REM for B/B+/E/M/C
40 REM (c) BAU Dec 89
50 :
60 DIM gbpb% &20,file% &20,data%
&20
70 room%=(HIMEM-(!2 AND &FFFF))-
&400
80 DIM buffer% room%
90 MODE 135
100 INPUT "Enter source (DFS) dri
ve: " dfs%
110 INPUT "Enter target (ADFS) pa
th: " adfs$
120 *DISC
130 OSCLI("DRIVE "+STR$(dfs%))
140 *ADFS
150 OSCLI("DIR "+adfs$)
160 CLS
170 PRINT "Copying from DFS to AD
FS"
180 VDU 28,0,24,39,2
190 :
200 PROCcopy("$","")
210 PRINT "Now checking other dir
ectories"
220 d$="#%&*@.!'()+,/0123456789;<
=>?ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_£
{}~"
230 FOR a=1 TO LEN d$
240 s$=MID$(d$,a,1)
250 IF a<7 THEN t$=STR$(ASCs$) EL
SE t$=s$+"/"
260 PROCcopy(s$,t$+"/")
270 NEXT
280 CLS
290 PRINT "Copy Complete."
300 END
310 :
320 DEF PROCcopy(source_dir$,targ
et_prefix$)
330 any%=FALSE
340 *DISC
350 OSCLI("DIR "+source_dir$)
360 files%=0
370 REPEAT
380 *DISC
```

Continued ▶

## MUSIC

◀ Continued

```
390 gbpb%!1=data%
400 gbpb%!5=1
410 gbpb%!9=files%
420 A%=8
430 X%=gbpb% MOD &100
440 Y%=gbpb% DIV &100
450 CALL &FFD1
460 files%=gbpb%!9
470 end%=(gbpb%!5<>0)
480 IF NOT(end%) THEN PROCdocopy
490 UNTIL end%
500 ENDPROC
510 :
520 DEF PROCdocopy
530 IF NOT(any%) THEN PRINT "Copying directory ";source_dir$;" (Prefix """;target_prefix$;""")":any%=TRUE
540 data%?(1+?data%)=&D
550 name$=$(data%+1)
560 PRINT name$;SPC2;
570 !file%=data%+1
580 A%=5
590 X%=file% MOD &100
600 Y%=file% DIV &100
610 CALL &FFDD
620 length%=file%!10
630 IF length%>room% THEN PROCslow ELSE PROCfast
640 A%=1
650 $(data%+1)=target_prefix$+name$
660 CALL &FFDD
670 PRINT
680 ENDPROC
690 :

700 DEF PROCslow
710 copied%=0
720 PRINT "Slow: ";
730 h%=POS:v%=VPOS
740 *DISK
750 in%=OPENIN(name$)
760 *ADFS
770 OSCLI("SAVE "+target_prefix$+name$+" "+STR$~(buffer%)+" +"+STR$~(length%))
780 out%=OPENUP(target_prefix$+name$)
790 REPEAT
800 IF room%<length%-copied% THEN block%=room% ELSE block%=length%-copied%
810 PROCgbpb(4,in%)
820 PROCgbpb(2,out%)
830 copied%=copied%+block%
840 PRINT TAB(h%,v%);INT(100*(copied%/length%));"%";
850 UNTIL copied%=length%
860 CLOSE#in%
870 CLOSE#out%
880 ENDPROC
890 :
900 DEF PROCgbpb(A%,handle%)
910 LOCAL X%,Y%
920 gbpb%!1=buffer%
930 gbpb%!5=block%
940 gbpb%!9=0
950 ?gbpb%=handle%
960 X%=gbpb% MOD &100
970 Y%=gbpb% DIV &100
980 CALL &FFD1
990 ENDPROC
1000 :
1010 DEF PROCfast
1020 PRINT "Fast";
1030 OSCLI("LOAD "+name$+" "+STR$~(buffer%))
1040 *ADFS
1050 OSCLI("SAVE "+target_prefix$+name$+" "+STR$~(buffer%)+" +"+STR$~(length%))
1060 ENDPROC
```

### Listing 2.

```
10 REM Large file EDIT
20 REM by Alan Hodge
30 REM for Master 128 only
40 REM (c) BAU Dec 89
50 :
60 FOR pass=0 TO 3 STEP 3
70 P%=&C00
80 [OPT pass
90 .start_code
100 .upload
110 LDY #0
120 LDA &12
130 STA &82
140 LDA #&7E
150 STA &83
160 LDA &12
170 STA &84
180 LDA &13
190 STA &85
200 CMP #&68
210 BCC uploop
220 BRK
230 EQUB 0
240 EQUS "Program too long"
250 EQUB 0
260 .uploop
270 LDA (&84),Y
280 STA (&82),Y
290 SEC
300 LDA &82
310 SBC #1
320 STA &82
330 STA &84
340 BCS uploop
350 DEC &83
360 DEC &85
370 .cont
380 LDA &85
390 CMP &18
400 BCS uploop
410 CLC
420 LDA &83
430 ADC #1
440 STA &18
450 LDA #8
460 STA &82
470 LDA #2
480 STA &84
490 LDA #&0E
500 STA &83
510 STA &85
520 LDA# list MOD 256
530 STA &20E
540 LDA# list DIV 256
550 STA &20F
560 LDX #0
570 .insert
580 LDA string,X
590 TAY
600 PHX
610 LDX #0
620 LDA #138
630 JSR &FFF4
640 PLX
650 INX
660 CPX #string_end-string
670 BNE insert
680 RTS
690 .string
700 EQUS "LIST"+CHR$13
710 EQUS "CALL &"+STR$~reset+CHR$13
720 EQUS "*EDIT 82,84"+CHR$13
730 .string_end
740 .reset
750 LDA #&22
760 STA &20E
770 LDA #&E8
780 STA &20F
790 SEC
800 LDA &84
810 SBC #11
820 STA &84
830 LDA &85
840 SBC #0
850 STA &85
860 RTS
870 .list
880 PHA
890 PHP
900 PHY
910 LDY #0
920 CMP #10
930 BEQ no_lf
940 STA (&84),Y
950 CLC
960 LDA &84
970 ADC #1
980 STA &84
990 LDA &85
1000 ADC #0
1010 STA &85
1020 .no_lf
1030 PLY
1040 PLP
1050 PLA
1060 RTS
1070 .end_code
1080 ]
1090 NEXT
1100 OSCLI("SAVE ED "+STR$~start_code+" "+STR$~end_code)
```

### Listing 3.

```
10 REM NoLine List
20 REM by Jason O'Broin
30 REM for B/B+/E/M/C with Basic 2
40 REM (c) BAU Dec 89
50 :
60 store=&A8
70 wrchv=&20E
80 FOR pass=0 TO 3 STEP 3
90 P%=&900
100 [OPT pass
110 LDA wrchv
120 STA oldvec
130 LDA wrchv+1
140 STA oldvec+1
150 LDA #entry MOD 256
160 STA wrchv
170 LDA #entry DIV 256
180 STA wrchv+1
190 LDA #0
200 STA store
210 RTS
220
230 .entry
240 PHA
250 CMP #10
260 BEQ set
270 CMP #13
280 BEQ bye
290 CMP #4
300 BEQ reset
310 INC store
320 LDA store
330 CMP #6
340 BCC out
350 .bye
360 PLA
370 JMP (oldvec)
380 .out
390 PLA
400 RTS
410 .set
420 LDA #0
430 STA store
440 JMP bye
450 .reset
460 LDA oldvec
470 STA wrchv
480 LDA oldvec+1
490 STA wrchv+1
500 JMP bye
510 :
520 .oldvec
530 EQUW 0
540 ]NEXT
550 OSCLI"SAVE NoLine 900 "+STR$~(P%)
```

### Listing 4.

```
10 REM Printer Test
20 REM by Jeremy Solly
30 REM for B/B+/E/M/C/A
40 REM (c) BAU Dec 89
50 :
60 IF FNprint THEN 110
70 REPEAT
80 PRINT "Switch your printer on and press a key"
90 IF GET
100 UNTIL FNprint
110 PRINT "Your printer is now on "
120 END
130 :
140 DEFFNprint
150 VDU 2,1,0,1,127,3
160 IF INKEY(10)
170 =ADVAL-4 = 63
```

See Interlude, page 19

### Listing 1.

```
"Abar" []  "Asusbar" []  "BbFbar" []
"Bbbar" [] "CDbar" []    "CEbbar" []
"Cbar" []  "DCbar" []    "Dmbar" []
"Ebbar" [] "Fbar" []     "RUN" []
"ah" []    "allvol" []   "blow" []
"end1" []  "end2" []     "fade1" []
"fade2" [] "introrest" [] "lead1" []
"lead2" [] "lead3" []    "lead4" []
"mix" []   "part1" []    "part2" []
"part3" [] "part4" []    "part5" []
"rest" []  "sig" []      "tune" []

"Abar" [%STAFF
-1:48,+C(4,EA)+C(4,EA)+C(4,EA)+C(4,EA)
]

"Asusbar" [%STAFF
-1:48,G(4,AD)G(4,AD)G(4,AD)G(4,AD)
]

"BbFbar" [%STAFF
-2:48,B(4,FD)B(4,FD)f(4,CA)f(4,CA)
]

"Bbbar" [%STAFF
-1:48,D(4,FB)D(4,FB)D(4,FB)D(4,FB)
]

"CDbar" [%STAFF
-1:48,C(G)C(G)D(A)D(A)
]

"CEbbar" [%STAFF
-1:48,G(4,CE)G(4,CE)G(4,B-E)G(4,B-E)
]

"Cbar" [%STAFF
-1:48,C(4,EG)C(4,EG)C(4,EG)C(4,EG)
]

"DCbar" [%STAFF
-1:48,D(4,A)D(4,A)c(4,G)c(4,G)
]

"Dmbar" [%STAFF
-1:48,D(4,A)D(4,A)D(4,A)D(4,A)
]

"Ebbar" [%STAFF
-2:48,B(4,-EG)B(4,-EG)B(4,-EG)B(4,-EG)
]

"Fbar" [%STAFF
-1:48,C(4,FA)C(4,FA)C(4,FA)C(4,FA)
]

"RUN" [7 MODE MENUDISP
%
%
%
%MENUDISP starts at the top of the
%screen and clears blank lines of the
%menu preventing the display of graphics
%or other non-menu text above the menu.
%The solution is to add graphics AFTER
%the menu but before the MENU word.
%       RUN the program %"12345"PLAY
30 #OUT DISPLAY
%           A Christmas Tale
%      (c) Ian Waugh 1988 & 1989
150#OUT"ffffffffffffffffffffffffff"$OUT
"ffffffff$"$OUT  MENU
]

"ah" [2 CHANS
1 CHAN
 Bright      Delvib      Tailed
```

Continued ▶

◀ Continued

```
  ON INVERT    3 SHIFT
2 CHAN
 Reedy        Vibrato     Tailed
 128 AMP    12Ø OFFSET
EVERY CHAN
]

"allvol" [3 FOR( % No. of parts to fade
  COUNT SHARE #11 VOL
)FOR
#2 PNUM  SHARE
]

"blow" [2 CHANS
1 CHAN
          -2 POS
 Metal    Wide    Onoff
 ON RM
2 CHAN
  297 SHIFT
 Metal    Wide    Onoff
  ON PHSET
]

"end1" [%STAFF
Ø:48,Afd
]

"end2" [%STAFF
Ø:24,A/f/d/dE|192,F|24, F/////eF|
Ø:192,G| G| G|24, G/////fe|48,d^^/|
]

"fade1" [128  8 FOR(#11 4 SHARE VOL 4#-
192,/ )FOR #2
]

"fade2" [128 REP(#11 allvol 4#-
#11 Ø #< )UNTIL(/)REP #2
]

"introrest" [%STAFF
192,^|^|^|^|
]

"lead1" [%STAFF
Ø:24,AB|C/aBC/aB|C/D/a/fG|A/fGA/fG|
Ø:24,A/B/agfe|d/EFG/fG|A/D/cbag|
Ø:24,F/eFG/fG|
]

"lead2" [%STAFF
Ø:48,Afd/|192, d| d|48,^/^
]

"lead3" [%STAFF
48,^|1:24,CDcDa/gf|G/C/a/gf|
Ø:24,G/C/a/gf|G/A/gfeF|CDcDa/gf|
Ø:24,G/C/a/gf|G/A/gfeF|192,d| d| d|
24,^///^/-12a -1:DE|
]

"lead4" [%STAFF
-1:192,F|24, F/////FG|192,A|
-1:24, A/////+cD|192,E|
-1:24, E/////EF|192,G|
-1:24, G/////Øa!BC|D/cba/aB|
1:24,C/bag/gA|B/agf/f/|192,G| G| G|
Ø:48, G//e|d^^/|192,^|^|48,^/^
]

"mix" [M5MIX 48,168=T 192 M5TUNE
1 SHARE 3 VOICES Vibglock
 1 VOICE 116 VOL -1 PAN
 2 VOICE 116 VOL Ø PAN
 3 VOICE 116 VOL 1 PAN
2 SHARE 2 VOICES
 1 VOICE Vibglock 128 VOL 2 PAN
 2 VOICE ah 12Ø VOL -2 PAN
3 SHARE 2 VOICES
 1 VOICE ah 124 VOL -1 PAN
 2 VOICE Vibglock 124 VOL 1 PAN
4 SHARE 1 VOICES blow
 1 VOICE 128 VOL 1 PAN
PNUM SHARE
]

"part1" [SCORE sig introrest
4 FOR( Dmbar )FOR
  2 FOR(
4 FOR( Dmbar )FOR 3 FOR( DCbar )FOR
4 FOR( Dmbar )FOR
  )FOR Dmbar
6 FOR( CDbar )FOR 4 FOR( Dmbar )FOR


Fbar Fbar Abar Abar Cbar Cbar
Ebbar Ebbar BbFbar CEbbar BbFbar
4 FOR( Asusbar )FOR
4 FOR( Dmbar )FOR
4 FOR( Dmbar )FOR 3 FOR( DCbar )FOR
5 FOR( Dmbar )FOR 3 FOR( DCbar )FOR
Dmbar Bbbar Bbbar Cbar Cbar Cbar Cbar
16 FOR( Dmbar )FOR ^(^^)
]

"part2" [SCORE
tune
]

"part3" [SCORE
tune
]

"part4" [SCORE
-2: 192, C/// fade1
7Ø FOR( 192,/ )FOR 128 VOL
-2: 192, C/// ////
]

"part5" [SCORE
82 FOR( 192,^ )FOR
fade2
]

"rest" [%STAFF
192,^|^|^|48,^/^
]

"sig" [%STAFF
SCORE48,4BAR
K(-B)K
]

"tune" [SCORE sig introrest
rest 24 2 Echo
lead1 lead2 lead1 lead2
lead3
lead4
lead1 end1
lead1 end2
]
```

See Stitched Up, page 72

## Listing 1.

```
   1Ø REM KNITone
   2Ø REM by Joan Barnard
   3Ø REM for B/B+/M/C/E/A
   4Ø REM (c) BAU December 1989
   5Ø :
   6Ø MODE 7
   7Ø ON ERROR GOTO 254Ø
   8Ø PROCsetup
   9Ø PROCinfo
  1ØØ MODE M
  11Ø IF M=2 OR M=5 w=19 ELSE w=39
  12Ø IF (M=Ø OR M=4) colour$(1)="w
hite"
  13Ø IF tape%=FALSE GOTO 15Ø
  14Ø *OPT 1,Ø
  15Ø OSCLI "LOAD "+F$
  16Ø PROCframe
  17Ø IF M=2 GOTO19Ø
  18Ø PROCwindow
  19Ø VDU 26
  2ØØ CLS
  21Ø IF tape%=TRUE PROCreload
  22Ø OSCLI "LOAD "+F$
  23Ø IF size=1 GOTO 26Ø
  24Ø MOVE (X1-64),(Y2-12):IF Y2>75
 DRAW (X2+64),(Y2-12) ELSE MOVE (X2
+64),(Y2-12)
  25Ø DRAW (X2+64),(Y1+12):DRAW (X1
-64),(Y1+12):DRAW (X1-64),(Y2-12)
  26Ø *FX 3,1Ø
  27Ø PROCprintdesign
  28Ø PROCwait
  29Ø PROCprintrows
  3ØØ VDU 1,12
  31Ø *FX 3,4
  32Ø *OPT
  33Ø VDU 3
  34Ø END
  35Ø :
  36Ø DEF PROCprintrows
  37Ø N%=(Y1-Y2)/ystep+1
  38Ø PRINT'''"PATTERN (starting wi
th right side of work facing):-"
  39Ø IF N% MOD2=Ø GOTO 46Ø
  4ØØ FOR C%=1 TO (N%-1) STEP 2
  41Ø PROCdown(C%)
  42Ø PROCup(C%+1)
  43Ø IF C%=49 PROCwait
  44Ø NEXT C%
  45Ø PROCdown(N%):ENDPROC
  46Ø FOR C%=1 TO N% STEP 2
  47Ø PROCdown(C%)
  48Ø PROCup(C%+1)
  49Ø IF C%=49 PROCwait
  5ØØ NEXT C%
  51Ø ENDPROC
  52Ø :
  53Ø DEF PROCdown(R)
  54Ø PRINT
  55Ø Y=ystep*(R-1)+Y2
  56Ø IF R<1Ø PRINT;"Row ";" ";R;"
";
  57Ø IF R>9 PRINT;"Row ";R;"  ";
  58Ø X=X2
  59Ø FLAG=1
  6ØØ Tot%=1
  61Ø IF X<X1 GOTO 67Ø
  62Ø R%=POINT(X,Y):Q%=POINT(X+xste
p,Y)
  63Ø IF FLAG=1 FLAG=Ø:X=X-xstep:GO
TO 61Ø
  64Ø IF R%=Q% Tot%=Tot%+1:X=X-xste
p:GOTO 61Ø
  65Ø IF M=2 PRINT;Tot%;" ";range$(
Q% MOD8);", ";:X=X-xstep:GOTO 6ØØ
  66Ø PRINT;Tot%;" ";colour$(Q% MOD
8);", ";:X=X-xstep:GOTO 6ØØ
  67Ø IF(R%=Q% AND M=2)PRINT;Tot%;"
 ";range$(Q% MOD8);
  68Ø IF(R%=Q% AND NOT(M=2))PRINT;T
ot%;" ";colour$(Q% MOD8);
  69Ø ENDPROC
  7ØØ :
  71Ø DEF PROCup(R)
  72Ø PRINT
  73Ø Y=ystep*(R-1)+Y2
  74Ø IF R<1Ø PRINT;"Row ";" ";R;"
";
  75Ø IF R>9 PRINT;"Row ";R;"  ";
  76Ø X=X1
  77Ø FLAG=1
  78Ø Tot%=1
  79Ø IF X>X2 GOTO 85Ø
  8ØØ R%=POINT(X,Y):Q%=POINT(X-xste
p,Y)
  81Ø IF FLAG=1 FLAG=Ø:X=X+xstep:GO
TO 79Ø
  82Ø IF R%=Q% Tot%=Tot%+1:X=X+xste
p:GOTO 79Ø
  83Ø IF M=2 PRINT;Tot%;" ";range$(
Q% MOD8);", ";:X=X+xstep:GOTO 78Ø
  84Ø PRINT;Tot%;" ";colour$(Q% MOD
8);", ";:X=X+xstep:GOTO 78Ø
  85Ø IF(R%=Q% AND M=2)PRINT;Tot%;"
 ";range$(Q% MOD8);
  86Ø IF(R%=Q% AND NOT(M=2))PRINT;T
ot%;" ";colour$(Q% MOD8);
  87Ø ENDPROC
  88Ø :
  89Ø DEF PROCprintdesign
  9ØØ *FX 6
  91Ø VDU 2
  92Ø PRINT "KNITTING DESIGN:-"
  93Ø PRINT
  94Ø PRINT "Row"
  95Ø VDU 1,27,51,18
  96Ø No=(Y1-Y2)/ystep+1
  97Ø FOR Y=Y1 TO Y2 STEP -ystep
  98Ø IF No>9 PRINT;No;" ";
  99Ø IF No<1Ø PRINT;" ";No;" ";
 1ØØØ FOR X=X1 TO X2 STEP xstep
 1Ø1Ø H%=POINT(X,Y)
 1Ø2Ø PRINT;~H%;
 1Ø3Ø NEXT X
 1Ø4Ø IF No>9 PRINT;" ";No;
 1Ø5Ø IF No<1Ø PRINT;"  ";No;
 1Ø6Ø PRINT
 1Ø7Ø No=No-1
 1Ø8Ø NEXT Y
 1Ø9Ø VDU 1,27,5Ø
 11ØØ VDU 1,12
 111Ø ENDPROC
 112Ø :
 113Ø DEF PROCwindow
 114Ø VDU 28,Ø,13,19,Ø
 115Ø CLS
 116Ø REPEAT
 117Ø PROCmessage
 118Ø UNTIL r>2
 119Ø ENDPROC
 12ØØ :
 121Ø DEF PROCframe
 122Ø Y1=1Ø23:Y2=75
 123Ø X1=48:X2=1216
 124Ø MOVE 48,1Ø23:DRAW 1216,1Ø23:D
RAW 1216,75:DRAW 48,75:DRAW 48,1Ø23
 125Ø REPEAT
 126Ø IF INKEY -42 Y1=Y1-12:MOVE 48
,Y1:DRAW 1216,Y1
 127Ø IF INKEY -58 Y2=Y2+12:MOVE 48
,Y2:DRAW 1216,Y2
 128Ø IF INKEY -122 X1=X1+16:MOVE X
1,75:DRAW X1,1Ø23
 129Ø IF INKEY -26 X2=X2-16:MOVE X2
,75:DRAW X2,1Ø23
 13ØØ FOR T=1 TO 1ØØ:NEXT T
 131Ø UNTIL INKEY -74
 132Ø IF ((X2-X1)=1168 AND (Y1-Y2)=
948)THEN PROCsize
 133Ø IF size=1 THEN xstep=INT((X2-
X1)/41):ystep=INT((Y1-Y2)/45):X1=X2
-41*xstep:Y2=Y1-45*ystep:ENDPROC
 134Ø xstep=16:ystep=12
 135Ø ENDPROC
 136Ø :
 137Ø DEF PROCprinter
 138Ø CLS
 139Ø PRINTTAB(3,8);"Please check p
rinter is on line."
 14ØØ PRINTTAB(6,16);"PRESS ANY KEY
 TO CONTINUE"
 141Ø G=GET
 142Ø ENDPROC
 143Ø :
 144Ø DEF PROCsetup
 145Ø DIM colour$(3),range$(7)
 146Ø RESTORE 264Ø:FOR I%=Ø TO 7:RE
AD range$(I%):NEXT I%
 147Ø RESTORE 265Ø:FOR I%=Ø TO 3:RE
AD colour$(I%):NEXT I%
 148Ø r$="YyNn":size=Ø
 149Ø PRINTTAB(6,4);CHR$(134);CHR$(
141);"KNITTING PATTERNS FROM"
 15ØØ PRINTTAB(6,5);CHR$(134);CHR$(
141);"KNITTING PATTERNS FROM"
 151Ø PRINTTAB(13,7);CHR$(134);CHR$
(141);"SCREENS"
 152Ø PRINTTAB(13,8);CHR$(134);CHR$
(141);"SCREENS"
 153Ø ENDPROC
 154Ø :
 155Ø DEF PROCinfo
 156Ø T%=(USR&FFDA)
 157Ø IF (T% AND &FF)=4 tape%=FALSE
 ELSE tape%=TRUE
 158Ø PRINT'''"Filename of screen y
ou wish to use for"
 159Ø PRINT"the pattern ";
 16ØØ INPUT F$
 161Ø PRINT''"Screen Mode (Ø,1,2,4 o
r 5) ";:INPUT M
 162Ø IF NOT(M=Ø OR M=1 OR M=2 OR M
=4 OR M=5) GOTO 161Ø
 163Ø PROCprinter
 164Ø PROCinstructions
 165Ø IF tape%=TRUE PROCtape
 166Ø ENDPROC
 167Ø :
 168Ø DEF PROCtape
 169Ø CLS
 17ØØ PRINTTAB(Ø,4);"Press PLAY on
recorder ready for loading"
 171Ø PRINT;"screen, filename ";F$;
"."
 172Ø PRINT''"No filing system messa
ges will be given."
 173Ø PRINTTAB(6,16);"Press a key t
o continue."
 174Ø G=GET
 175Ø ENDPROC
 176Ø :
 177Ø DEF PROCreload
 178Ø PRINTTAB(Ø,4);"Prepare to rel
oad":PRINT"screen ";F$;"."
 179Ø PRINT''"HIT ANY KEY WHEN":PRI
NT"YOU ARE READY."
 18ØØ *MOTOR 1
 181Ø *FX 15
```

Continued ▶

# EMULATION

◀ **Continued**

```
1820 B=GET
1830 CLS
1840 *MOTOR 0
1850 ENDPROC
1860 :
1870 DEF PROCinstructions
1880 CLS
1890 PRINTTAB(0,4);"When the screen is loaded use the cursor"
1900 PRINTTAB(0,5);"keys to adjust the frame round the area required for the pattern."
1910 PRINT'"When";CHR$(134);"COMPLETELY";CHR$(135);"finished, press RETURN."
1920 PRINTTAB(6,16);"PRESS ANY KEY TO CONTINUE"
1930 G=GET
1940 ENDPROC
1950 :
1960 DEF PROCmessage
1970 PRINTTAB(0,1);"Colour scheme:-"
1980 PRINTTAB(0,2);"Colour 0=";colour$(0)
1990 PRINTTAB(0,3);"Colour 1=";colour$(1)
2000 IF(M=1 OR M=5)PRINTTAB(0,4);"Colour 2=";colour$(2)
2010 IF(M=1 OR M=5)PRINTTAB(0,5);"Colour 3=";colour$(3)
2020 PRINTTAB(0,7);"Do you wish to "
2030 PRINTTAB(0,8);"change the colours"
2040 PRINTTAB(0,9);"(Y/N)?"
2050 A$=GET$
2060 r=INSTR(r$,A$):IF r<1 GOTO 2020
2070 IFr>2 ENDPROC
2080 PROCchangecol
2090 ENDPROC
2100 :
2110 DEF PROCchangecol
2120 PRINTTAB(0,11);"Change which"
2130 PRINTTAB(0,12);"colour?";
2140 IF (M=1 OR M=5)PRINT;"(0-3)"ELSE PRINT;"(0-1)"
2150 L=GET:IF L<48 OR L>51 GOTO 2120
2160 CLS
2170 PRINTTAB(0,1);"Colours available:-"
2180  PRINTTAB(0,2);"A=black,B=red,"
2190 PRINTTAB(0,3);"C=green,D=yellow,"
2200 PRINTTAB(0,4);"E=blue,F=magenta,"
2210 PRINTTAB(0,5);"G=cyan,H=white."
2220 PRINTTAB(0,7);"Change to? (A-H)"
2230 P=(GET AND &DF):IF P<65 OR P>72 GOTO 2220
2240 VDU19,L-48,P-65,0,0,0
2250 colour$(L-48)=range$(P-65)
2260 CLS
2270 PROCmessage
2280 ENDPROC
2290 :
2300 DEF PROCsize
2310 size=0
2320 VDU 28,0,13,19,0
2330 CLS
2340 PRINTTAB(0,1)"Please choose a size"
2350 PRINTTAB(0,2)"for the pattern:-"
2360 PRINTTAB(0,4)"1. 46 rows/42 sts."
2370 PRINTTAB(0,5)"2. 80 rows/74 sts."
2380 PRINTTAB(0,7)"1 or 2?"
2390 *FX 15
2400 c=GET
2410 IF NOT(c=49 OR c=50) GOTO 2340
2420 IF c=49 size=1 ELSE size=2
2430 ENDPROC
2440 :
2450 DEF PROCwait
2460 *FX 3,4
2470 VDU 28,0,31,w,30
2480 PRINT "PRESS SPACE BAR ..."
2490 G=GET
2500 CLS
2510 *FX 3,10
2520 ENDPROC
2530 :
2540 ON ERROR OFF
2550 *MOTOR 0
2560 *OPT
2570 *FX 15,0
2580 *FX 3,4
2590 VDU 1,27,50
2600 MODE 7
2610 REPORT:PRINT" at line ";ERL
2620 END
2630 :
2640 DATA black,red,green,yellow,blue,magenta,cyan,white
2650 DATA black,red,yellow,white
```

**See Copy Cats, page 76**

**Listing 1.**

```
10 REM 68000 Emulator
20 REM for Arc only
30 REM by Richard J. Browning
40 REM (c) BAU December 1989
50 :
60 MODE 8
70 PROCcode
80 PROCsetup_screen
90 terminate%=FALSE
100 REPEAT
110 PROCenter_instructions
120 UNTIL terminate%
130 MODE 0:END
140 :
150 DEF PROCsetup_screen
160 VDU 23,224,1,3,5,9,31,33,65,129
170 CLS:PRINT:COLOUR 1,70,70,70:COLOUR 3,200,200,200:VDU 19,0,4;0;0;0;19,2,6;0;0;0;
180 COLOUR 2:PROCwide("  Acorn User "+CHR$224+"rchimedes 68000 Emulator")
190 RECTANGLE 8,943,1262,64:RECTANGLE 0,0,1279,1023:RECTANGLE 8,16,1262,896:GCOL 0,1:RECTANGLE FILL 10,20,1258,888
200 VDU 28,2,29,77,4:COLOUR 129:PROChelp_screen
210 ENDPROC
220 :
230 DEF PROCwide(wide_string$)
240 LOCAL i%
250 FOR i%=1 TO LENwide_string$:VDU ASCMID$(wide_string$,i%,1),32:NEXT
260 ENDPROC
270 :
280 DEF PROChelp_screen COLOUR 3
290 CLS:PROCwide("Available commands are:"):PRINT'
300 RESTORE:READ A$,B$
310 WHILE A$<>"XX"
320 PRINTTAB(40)B$;CHR$13;:PROCwide(A$):PRINT
330 READ A$,B$
340 ENDWHILE
350 COLOUR 2:PRINT:ENDPROC
360 :
370 DATA HELP,Lists available commands (This)
380 DATA P <val>,Pokes <val> to current address
390 DATA D,Previous memory location
400 DATA U,Next memory location
410 DATA SETMEM <val>,Moves to memory location <val>
420 DATA DR <num>,Set data reg <num> to a value
430 DATA AR <num>,Set addr reg <num> to a value
440 DATA "CLEAR <val1>,<val2>",Erases memory from <val1> to <val2>
450 DATA DISP <val>,Shows contents of next <val> locs
460 DATA SHOWREGS,Displays all 17 registers
470 DATA EMULATE <val>,Begin emulation from <val>
480 DATA QUIT,Leaves Emulator
490 DATA XX,XX
500 :
510 DEF PROCcode
520 DIM codespace 1300
530 DIM em_mem 20*1024
540 link=14
550 sp=13
560 em_pc=12
570 em_inst=11
580 table=10
590 FOR pass=0 TO 2 STEP 2
600 P%=codespace
610 [ OPT pass
620 ; Clears memory from R0 to R1
630 ; R2 zeroed
640 .clearmem
650 MOV R2,#0
660 .clearmem_loop
670 STRB R2,[R0],#1
680 CMP R1,R0
690 BGE clearmem_loop
700 MOV pc,link
710 :
720 .loc_em_mem EQUD em_mem
730 .pc_store EQUD 0
740 :
750 .emulate STR link,basic_return_addr
760 ADR table,main_instruction_set
770 LDR em_pc,pc_store
780 .em_loop
790 BL get_word
800 MOV R0,em_inst,LSR #12
810 ADD R0,table,R0,LSL #2
820 MOV pc,R0
830 :
840 .get_word
850 MOV R9,#0:MOV R8,#0:MOV em_inst,#0
860 LDRB R9,[em_pc],#1:LDRB R8,[em_pc],#1
870 ORR em_inst,R8,R9,LSL #8
880 MOV pc,link
890 :
900 .basic_return_addr EQUD 0
910 :
920 .main_instruction_set
930 B bitops
940 B move_b
950 B exit
960 B move_w
970 B trap
980 B exit
990 B exit
1000 B exit
1010 B exit
1020 B exit
1030 B exit
1040 B exit
1050 B exit
1060 B exit
1070 B exit
1080 :
1090 .vald_addr STMFD (sp)!,{link}
1100 MOV R6,#0:MOV R7,#1
1110 ADD R6,R6,R7,LSL R2
```

**Continued** ▶

# YELLOW PAGES

## EMULATION

◀ **Continued**

```
 112Ø ANDS R6,R6,R1
 113Ø LDMEQFD (sp)!,{pc}
 114Ø ADR R7,address_regs:ADR R6,da
ta_regs
 115Ø ADR R9,mem_modes
 116Ø ADD R9,R9,R2,LSL #2
 117Ø MOV pc,R9
 118Ø .mem_modes
 119Ø B data_mode
 12ØØ B addr_mode
 121Ø B addr_mode_indr
 122Ø B addr_mode_indr_postinc
 123Ø B addr_mode_indr_predec
 124Ø B addr_mode_indr_disp
 125Ø B addr_mode_index_reg
 126Ø :
 127Ø ALIGN
 128Ø .address_regs EQUD Ø:EQUD Ø:E
QUD Ø:EQUD Ø:EQUD Ø:EQUD Ø:EQUD Ø:E
QUD Ø
 129Ø .data_regs EQUD Ø:EQUD Ø:EQUD
Ø:EQUD Ø:EQUD Ø:EQUD Ø:EQUD Ø:EQUD
Ø
 13ØØ .stat_reg EQUD Ø
 131Ø :
 132Ø .data_mode
 133Ø TST RØ,#1
 134Ø MOVNE R8,em_inst
 135Ø MOVEQ R8,em_inst,LSR #9
 136Ø AND R8,R8,#7
 137Ø LDRNE R3,[R6,R8,LSL#2]
 138Ø STREQ R3,[R6,R8,LSL#2]
 139Ø MOVS R9,#1
 14ØØ LDMFD (sp)!,{pc}
 141Ø :
 142Ø .addr_mode
 143Ø TST RØ,#1
 144Ø MOVNE R8,em_inst
 145Ø MOVEQ R8,em_inst,LSR #9
 146Ø AND R8,R8,#7
 147Ø LDRNE R3,[R7,R8,LSL#2]
 148Ø STREQ R3,[R7,R8,LSL#2]
 149Ø MOVS R9,#1
 15ØØ LDMFD (sp)!,{pc}
 151Ø :
 152Ø .addr_mode_indr
 153Ø BL get_indr_addr
 154Ø ADD R5,R5,R4
 155Ø TST RØ,#1
 156Ø BLNE load_as_68k
 157Ø TST RØ,#1
 158Ø BLEQ store_as_68k
 159Ø MOVS R9,#1
 16ØØ LDMFD (sp)!,{pc}
 161Ø :
 162Ø .addr_mode_indr_postinc
 163Ø ADR R4,get_back1:STMFD (sp)!,
{R4}
 164Ø B addr_mode_indr:.get_back1
 165Ø TST RØ,#2:ADDNE R5,R5,#1
 166Ø TST RØ,#4:ADDNE R5,R5,#2
 167Ø TST RØ,#8:ADDNE R5,R5,#4
 168Ø ADR R4,em_mem:SUB R5,R5,R4
 169Ø STR R5,[R7,R8,LSL#2]
 17ØØ LDMFD (sp)!,{pc}
 171Ø :
 172Ø .exit:.move_l STR em_pc,pc_st
ore
 173Ø LDR pc,basic_return_addr
 174Ø :
 175Ø .addr_mode_indr_predec
 176Ø BL get_indr_addr
 177Ø TST RØ,#2:SUBNE R5,R5,#1:TST
RØ,#4:SUBNE R5,R5,#2
 178Ø TST RØ,#8:SUBNE R5,R5,#4:STR
R5,[R7,R8,LSL#2]
 179Ø ADD R5,R5,R4
 18ØØ TST RØ,#1
 181Ø BLNE load_as_68k
 182Ø TST RØ,#1
 183Ø BLEQ store_as_68k
 184Ø MOVS R9,#1
 185Ø LDMFD (sp)!,{pc}
 186Ø :
 187Ø .addr_mode_indr_disp
 188Ø BL get_indr_addr
 189Ø STMFD (sp)!,{R4,em_inst}
 19ØØ BL get_word
 191Ø ADD R5,R5,em_inst
 192Ø LDMFD (sp)!,{R4,em_inst}
 193Ø ADD R5,R5,R4
 194Ø TST RØ,#1
 195Ø BLNE load_as_68k
 196Ø TST RØ,#1
 197Ø BLEQ store_as_68k
 198Ø MOVS R9,#1
 199Ø LDMFD (sp)!,{pc}
 2ØØØ :
 2Ø1Ø .addr_mode_index_reg
 2Ø2Ø BL get_indr_addr
 2Ø3Ø STMFD (sp)!,{R4,em_inst}
 2Ø4Ø BL get_word
 2Ø5Ø MOV R2,em_inst
 2Ø6Ø LDMFD (sp)!,{R4,em_inst}
 2Ø7Ø ADD R5,R5,R4
 2Ø8Ø BL decode_extension
 2Ø9Ø TST RØ,#1
 21ØØ BLNE load_as_68k
 211Ø TST RØ,#1
 212Ø BLEQ store_as_68k
 213Ø MOVS R9,#1
 214Ø LDMFD (sp)!,{pc}
 215Ø :
 216Ø .get_indr_addr STMFD (sp)!,{l
ink}
 217Ø ADR R4,em_mem
 218Ø TST RØ,#1
 219Ø MOVNE R8,em_inst
 22ØØ MOVEQ R8,em_inst,LSR #9
 221Ø AND R8,R8,#7
 222Ø LDR R5,[R7,R8,LSL#2]
 223Ø LDMFD (sp)!,{pc}
 224Ø :
 225Ø .decode_extension
 226Ø MOV R9,R2:AND R9,R9,#255:ADD
R5,R5,R9
 227Ø MOV R9,R2,LSR#12:AND R9,R9,#7
 228Ø TST R2,#%1ØØØØØØØØØØØØØØØ
 229Ø BEQ decode_addr
 23ØØ LDR R1,[R6,R9,LSL#2]
 231Ø TST R2,#%ØØØØ1ØØØØØØØØØØØ
 232Ø MOVNE R1,R1,LSL#16:MOVNE R1,R
1,LSR#16
 233Ø ADD R5,R5,R1
 234Ø MOV pc,link
 235Ø .decode_addr
 236Ø LDR R1,[R7,R9,LSL#2]
 237Ø TST R2,#%ØØØØ1ØØØØØØØØØØØ
 238Ø MOVNE R1,R1,LSL#16:MOVNE R1,R
1,LSR#16
 239Ø ADD R5,R5,R1
 24ØØ MOV pc,link
 241Ø :
 242Ø .store_as_68k STMFD (sp)!,{li
nk}
 243Ø TST RØ,#2:STRNEB R3,[R5]
 244Ø TST RØ,#4:STRNEB R3,[R5,#1]
 245Ø MOVNE R3,R3,LSR#8:STRNEB R3,[
R5]
 246Ø TST RØ,#8:STRNEB R3,[R5,#3]
 247Ø MOVNE R3,R3,LSR#8:STRNEB R3,[
R5,#2]:MOVNE R3,R3,LSR#8:STRNEB R3,
[R5,#1]
 248Ø MOVNE R3,R3,LSR#8:STRNEB R3,[
R5]
 249Ø LDMFD (sp)!,{pc}
 25ØØ :
 251Ø .load_as_68k STMFD (sp)!,{lin
k}
 252Ø TST RØ,#2:LDRNEB R3,[R5]
 253Ø TST RØ,#4:LDRNEB R3,[R5]
 254Ø MOVNE R3,R3,LSL#8:LDRNEB R4,[
R5,#1]
 255Ø ORRNE R3,R3,R4
 256Ø TST RØ,#8:LDRNEB R3,[R5]
 257Ø MOVNE R3,R3,LSL#24:LDRNEB R4,
[R5,#1]:MOVNE R4,R4,LSL#16:ORRNE R3
,R3,R4
 258Ø LDRNEB R4,[R5,#2]:MOVNE R4,R4
,LSL#8:ORRNE R3,R3,R4:LDRNEB R4,[R5
,#3]
 259Ø ORRNE R3,R3,R4
 26ØØ LDMFD (sp)!,{pc}
 261Ø :
 262Ø .move_b
 263Ø MOV RØ,#3
 264Ø LDR R1,moveb_flags1
 265Ø MOV R2,em_inst,LSR #3:AND R2,
R2,#7
 266Ø BL vald_addr
 267Ø BEQ error
 268Ø MOV RØ,#2:LDR R1,moveb_flags2
 269Ø MOV R2,em_inst,LSR #6:AND R2,
R2,#7
 27ØØ AND R3,R3,#255
 271Ø LDR R4,stat_reg:BIC  R4,R4,#1
5
 272Ø CMP R3,#Ø:ORREQ R4,R4,#4
 273Ø TST R3,#128:ORRNE R4,R4,#8
 274Ø STR R4,stat_reg
 275Ø BL vald_addr
 276Ø BEQ error
 277Ø B exit
 278Ø .moveb_flags1 EQUW %ØØØØØØØ1
1111111
 279Ø .mov   _flags2 EQUW %ØØØØØØØ1
1111111
 28ØØ :
 281Ø .move_w
 282Ø MOV RØ,#5
 283Ø LDR R1,movew_flags1
 284Ø MOV R2,em_inst,LSR #3:AND R2,
R2,#7
 285Ø BL vald_addr
 286Ø BEQ error
 287Ø MOV RØ,#4:LDR R1,movew_flags2
 288Ø MOV R2,em_inst,LSR #6:AND R2,
R2,#7
 289Ø :
 29ØØ LDR R4,stat_reg:BIC R4,R4,#15
 291Ø CMP R3,#Ø:ORREQ R4,R4,#4
 292Ø TST R3,#32768:ORRNE R4,R4,#8
 293Ø STR R4,stat_reg
 294Ø BL vald_addr
 295Ø BEQ error
 296Ø B exit
 297Ø .movew_flags1 EQUW %1111111Ø
1111111
 298Ø .movew_flags2 EQUW %1111111Ø
```

**Continued** ▶

◀ **Continued**

```
1111111
 2990 .error
 3000 MOV R0,#49:SWI 0
 3010 B exit
 3020 :
 3030 .trap
 3040 LDR R0,data_regs
 3050 SWI 0
 3060 B exit
 3070 :
 3080 .bitops
 3090 MOVS R4,em_inst,LSR#8:BEQ or_op
 3100 B exit
 3110 .or_op MOV R4,em_inst,LSR#6:MOV R0,#1
 3120 CMP R4,#0:ORREQ R0,R0,#2
 3130 CMP R4,#1:ORREQ R0,R0,#4
 3140 CMP R4,#2:BEQ exit
 3150 STMFD (sp)!,{em_inst}
 3160 BL get_word
 3170 MOV R4,em_inst
 3180 LDMFD (sp)!,{em_inst}
 3190 LDR R1,moveb_flags2
 3200 MOV R2,em_inst,LSR#3:AND R2,R2,#7
 3210 STMFD (sp)!,{R4}
 3220 BL vald_addr
 3230 LDMFD (sp)!,{R4}
 3240 TST R0,#2:ANDNE R4,R4,#255
 3250 ORR R3,R3,R4
 3260 AND R0,R0,#14
 3270 LDR R1,moveb_flags2
 3280 MOV R2,em_inst,LSR#3:AND R2,R2,#7
 3290 :
 3300 LDR R4,stat_reg:BIC R4,R4,#15
 3310 CMP R3,#0:ORREQ R4,R4,#4
 3320 TST R0,#2:BNE or_stat_byte
 3330 TST R3,#32768:ORRNE R4,R4,#8
 3340 B skip_or_byte
 3350 .or_stat_byte TST R3,#128:ORRNE R4,R4,#8
 3360 .skip_or_byte STR R4,stat_reg
 3370 BL vald_addr
 3380 BEQ error
 3390 B exit
 3400 .store1 EQUD0
 3410 ]
 3420 NEXT
 3430 ENDPROC
 3440 :
 3450 DEF PROCenter_instructions
 3460 mem_ptr=em_mem
 3470 REPEAT
 3480 PROCupdate
 3490 INPUT LINE "* "cmd_string$
 3500 IF cmd_string$="" GOTO 3560
 3510 N$="":L%=1:REPEAT C$=MID$(cmd_string$,L%,1):N$=N$+C$:L%+=1:UNTIL L%>LENcmd_string$ OR C$=" "
 3520 IF C$=" " N$=LEFT$(N$,L%-2) ELSE N$=LEFT$(N$,L%-1)
 3530 RESTORE 3590:REPEAT:READF$:I%+=1:UNTIL F$=N$ OR F$="X"
 3540 IF F$="X" PRINT "No such command":GOTO 3560
 3550 dummy%=EVAL("FN"+N$+"(0)")
 3560 UNTIL terminate%
 3570 ENDPROC
 3580 :
 3590 DATA P,D,U,HELP,SETMEM,DR,AR,CLEAR,DISP,SHOWREGS,EMULATE,QUIT,X
 3600 :
 3610 DEF FNQUIT(D):terminate%=TRUE:=D
 3620 :
 3630 DEF FNHELP(D):PROChelp_screen:=D
 3640 :
 3650 DEF FNP(D):IF LENcmd_string$<3 =D
 3660 ON ERROR LOCAL PRINT "Incorrect syntax!":=D
 3670 val%=EVAL(MID$(cmd_string$,3,6))
 3680 IF val%<256 THEN
 3690 ?mem_ptr=val%:PRINT "Poked (byte): &";~val%:mem_ptr+=1
 3700 ELSE
 3710 IF (mem_ptr AND 1)=1 COLOUR3:PRINT "Warning: Not on word boundary! ";
 3720 ?mem_ptr=val% DIV 256:mem_ptr?1=val% MOD 256:PRINT "Poked (word): &";~val%:mem_ptr+=2
 3730 ENDIF
 3740 =D
 3750 :
 3760 DEF PROCupdate:SYS "OS_Byte",134 TO ,X,Y:VDU 28,2,30,77,30:COLOUR 131:COLOUR 0:CLS:PRINT "Current Location: &";~mem_ptr-em_mem;"  Contents of CL: &";~?mem_ptr;"  Program Counter: &";~!pc_store-em_mem;:COLOUR 129:COLOUR 2:VDU 28,2,29,77,4
 3770 VDU 31,X,Y:ENDPROC
 3780 :
 3790 DEF FNSETMEM(D):IF LENcmd_string$<8 =D
 3800 ON ERROR LOCAL PRINT "Incorrect syntax!":=D
 3810 val%=EVAL(MID$(cmd_string$,8,6))
 3820 IF val%>-1 mem_ptr=val%+em_mem:PRINT "Reset memory pointer to &";~val%
 3830 =D
 3840 :
 3850 DEF FNCLEAR(D):N$="":REPEAT C$=MID$(cmd_string$,L%,1):N$=N$+C$:L%+=1
 3860 UNTIL C$="," OR L%>LENcmd_string$:IF C$<>"," PRINT "Invalid syntax":=D
 3870 RIGHT$(N$,1)=CHR$0:val1%=EVAL N$
 3880 N$="":REPEAT:C$=MID$(cmd_string$,L%,1):N$=N$+C$:L%+=1
 3890 UNTIL L%>LENcmd_string$
 3900 val2%=EVAL N$:IF val2%<val1% PRINT "Second operand smaller than first!":=D
 3910 PRINT "Clearing from &";~val1%;" to &";~val2%;" (";val2%-val1%+1;" bytes)"
 3920 A%=val1%+em_mem:B%=val2%+em_mem:CALL clearmem
 3930 =D
 3940 :
 3950 DEF FNDISP(D):IF LENcmd_string$<6 =D
 3960 ON ERROR LOCAL PRINT "Incorrect syntax!":=D
 3970 val%=EVAL(MID$(cmd_string$,6,6))
 3980 IF val%<0 PRINT "Don't be silly!":=D
 3990 FOR i%=mem_ptr TO mem_ptr+val%-1:PRINT"&";~i%-em_mem;": &";~?i%:NEXT
 4000 =D
 4010 :
 4020 DEF FND(D):IF mem_ptr>em_mem mem_ptr+=-1
 4030 =D
 4040 :
 4050 DEF FNU(D):mem_ptr+=1
 4060 =D
 4070 :
 4080 DEF FNEMULATE(D):IF LENcmd_string$<9 =D
 4090 ON ERROR LOCAL PRINT "Incorrect syntax!":=D
 4100 val%=EVAL(MID$(cmd_string$,8,6))
 4110 IF val%<0 PRINT "Only 68000 code!":=D
 4120 !pc_store=val%+em_mem
 4130 PRINT "Starting emulation from &";~val%
 4140 CALL emulate
 4150 mem_ptr=!pc_store
 4160 =D
 4170 :
 4180 DEF FNDR(D):IF LENcmd_string$<4 =D
 4190 ON ERROR LOCAL PRINT "Incorrect syntax!":=D
 4200 reg%=EVAL(MID$(cmd_string$,4,6))
 4210 IF reg%<0 OR reg%>7 PRINT "Invalid data register!":=D
 4220 PRINT "Data Reg ";reg%;" = ";:INPUT val$
 4230 !(data_regs+4*reg%)=EVALval$
 4240 =D
 4250 :
 4260 DEF FNAR(D):IF LENcmd_string$<4 =D
 4270 ON ERROR LOCAL PRINT "Incorrect syntax!":=D
 4280 reg%=EVAL(MID$(cmd_string$,4,6))
 4290 IF reg%<0 OR reg%>7 PRINT "Invalid address register!":=D
 4300 PRINT "Address Reg ";reg%;" = ";:INPUT val$
 4310 !(address_regs+4*reg%)=EVALval$
 4320 =D
 4330 :
 4340 DEF FNSHOWREGS(D)
 4350 FOR i%=0 TO 7
 4360 PRINT "AR";i%;": &";~!(address_regs+4*i%);
 4370 PRINTTAB(20)"DR";i%;": &";~!(data_regs+4*i%)
 4380 NEXT
 4390 PRINT "SR: &";~!stat_reg
 4400 =D
>
```

See Every Step You Take, page 80

**Listing 1.**

```
10 REM KeyLog
20 REM by Peter Hunter
30 REM for M/C only
40 REM (c) BAU December 1989
50 :
60 DIM code &480
70 eventv=&220
80 osbyte=&FFF4
90 oswrch=&FFEE
100 osnewl=&FFE7
110 osword=&FFF1
120 :
130 PROCassemble
140 IF FNsaverom PROCinstall
150 END
160 :
170 DEF PROCassemble
180 FOR pass=4 TO 7 STEP 3
190 P%=&8000:O%=code
200 [OPT pass
210 :
220 .rom
230 JMP 0
240 JMP serv
250 EQUB &82
260 EQUB cprm-rom-1
270 EQUB 1
280 .title
290 EQUS "KeyLog"
300 EQUB 0
310 EQUS " 1.0"
320 EQUB 0
330 .cprm
340 EQUS "(C) BAU, 1989"
350 EQUB 0
360 :
370 .serv
380 PHP
390 PHA
400 PHX
410 PHY
420 TSX
430 LDA &103,X
440 CMP #4
450 BEQ serv5
460 CMP #9
470 BEQ serv3
480 CMP #&FE
490 BNE serv9
500 LDA flags
510 BEQ serv9
520 BPL serv2
530 LDA #&FD
540 LDX #0
550 LDY #&FF
560 JSR osbyte
570 LDA #&FD
580 CPX #0
590 BEQ serv1
600 DEA
610 .serv1
620 JSR logdata
630 JSR restart
640 BRA serv9
650 .serv2
660 JSR playon
670 BRA serv9
680 .serv3
690 JSR osnewl
700 LDY #0
710 .serv4
720 LDA title,Y
730 JSR oswrch
740 INY
750 CPY #cprm-title
760 BNE serv4
770 JSR osnewl
780 BRA serv9
790 .serv5
800 LDA &101,X
810 TAY
820 JSR ctest
830 BMI serv9
840 CPX #0
850 BNE serv6
860 JSR start
870 BRA serv8
880 .serv6
890 CPX #7
900 BNE serv7
910 JSR stop
920 BRA serv8
930 .serv7
940 JSR play
950 .serv8
960 TSX
970 STZ &103,X
980 .serv9
990 PLY
1000 PLX
1010 PLA
1020 PLP
1030 RTS
1040 :
1050 .ctest
1060 LDX #14
1070 .ctest1
1080 PHX
1090 PHY
1100 .ctest2
1110 LDA ctable,X
1120 BEQ ctest4
1130 LDA (&F2),Y
1140 AND #&DF
1150 CMP ctable,X
1160 BNE ctest3
1170 INX
1180 INY
1190 BRA ctest2
1200 .ctest3
1210 PLY
1220 PLA
1230 SEC
1240 SBC #7
1250 TAX
1260 BPL ctest1
1270 RTS
1280 .ctest4
1290 PLY
1300 PLX
1310 RTS
1320 :
1330 .ctable
1340 EQUS "KLON"
1350 EQUW 0
1360 EQUB 0
1370 EQUS "KLOFF"
1380 EQUW 0
1390 EQUS "KLPLAY"
1400 EQUB 0
1410 :
1420 .oldv:EQUW 0
1430 .evptr:EQUW 0
1440 .dptr:EQUW 0
1450 .time:EQUD 0:EQUB 0
1460 .count:EQUB 0
1470 .flags:EQUB 0
1480 :
1490 .start
1500 LDA flags
1510 BEQ start1
1520 RTS
1530 .start1
1540 LDA #&80
1550 STA flags
1560 LDA #(ASC "1")
1570 STA count
1580 JSR reset
1590 .restart
1600 LDX #log MOD 256
1610 LDY #log DIV 256
1620 JSR event
1630 JSR zclock
1640 LDA #14
1650 LDX #2
1660 JSR osbyte
1670 LDA #14
1680 LDX #6
1690 JMP osbyte
1700 :
1710 .stop
1720 LDA flags
1730 BEQ stop2
1740 LDA #13
1750 LDX #2
1760 JSR osbyte
1770 LDA #13
1780 LDX #4
1790 JSR osbyte
1800 LDA #13
1810 LDX #5
1820 JSR osbyte
1830 LDA #13
1840 LDX #6
1850 JSR osbyte
1860 LDA #&C9
1870 LDX #0
1880 LDY #0
1890 JSR osbyte
1900 SEI
1910 LDX oldv
1920 LDY oldv+1
1930 STX eventv
1940 STY eventv+1
1950 CLI
1960 BIT flags
1970 BPL stop1
1980 LDA #&FF
1990 JSR save
2000 .stop1
2010 STZ flags
2020 .stop2
2030 RTS
2040 :
2050 .play
2060 LDA flags
2070 BNE stop2
2080 LDA #(ASC "1")
2090 STA count
2100 LDY #&80
2110 JSR srfile
2120 LDA #2
2130 JSR incptr
2140 LDA #&40
2150 STA flags
2160 LDA #&C9
2170 LDX #1
2180 LDY #0
2190 JSR osbyte
```

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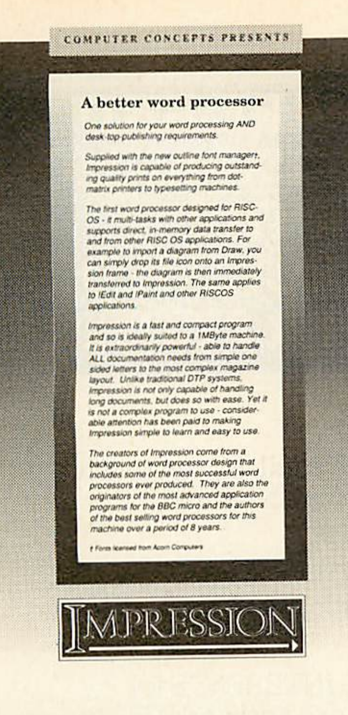
◀ Continued

```
2200 LDX #emkey MOD 256
2210 LDY #emkey DIV 256
2220 JSR event
2230 LDX data
2240 LDY data+1
2250 JSR setime
2260 LDA #14
2270 LDX #4
2280 JSR osbyte
2290 LDA #14
2300 LDX #5
2310 JMP osbyte
2320 :
2330 .event
2340 STX evptr
2350 STY evptr+1
2360 LDA &8E
2370 PHA
2380 LDA &8F
2390 PHA
2400 LDA #&A8
2410 LDX #0
2420 LDY #&FF
2430 JSR osbyte
2440 STX &8E
2450 STY &8F
2460 LDY #&30
2470 LDA evptr
2480 STA (&8E),Y
2490 INY
2500 LDA evptr+1
2510 STA (&8E),Y
2520 INY
2530 LDA &F4
2540 STA (&8E),Y
2550 PLA
2560 STA &8F
2570 PLA
2580 STA &8E
2590 SEI
2600 LDX eventv
2610 LDY eventv+1
2620 STX oldv
2630 STY oldv+1
2640 LDX #&30
2650 LDY #&FF
2660 STX eventv
2670 STY eventv+1
2680 CLI
2690 RTS
2700 :
2710 .log
2720 PHP
2730 PHA
2740 PHX
2750 PHY
2760 TSX
2770 LDA &103,X
2780 CMP #6
2790 BEQ log1
2800 CMP #2
2810 BNE log3
2820 LDA &102,X
2830 BNE log3
2840 LDA &101,X
2850 BRA log2
2860 .log1
2870 LDA #27
2880 .log2
2890 JSR logdata
2900 TSX
2910 LDA &103,X
2920 CMP #6
2930 BNE log3
2940 LDA #&7D
2950 JSR osbyte
2960 .log3
2970 PLY
2980 PLX
2990 PLA
3000 PLP
3010 JMP (oldv)
3020 :
3030 .logdata
3040 LDX &8E
3050 LDY &8F
3060 PHX
3070 PHY
3080 LDX dptr
3090 LDY dptr+1
3100 STX &8E
3110 STY &8F
3120 LDY #2
3130 STA (&8E),Y
3140 LDA #1
3150 JSR clock
3160 LDY #0
3170 LDA time,Y
3180 STA (&8E),Y
3190 INY
3200 LDA time,Y
3210 STA (&8E),Y
3220 LDA #3
3230 JSR incptr
3240 CMP #&BF
3250 BCC logd2
3260 BNE logd1
3270 LDA dptr
3280 CMP #&FB
3290 BCC logd2
3300 .logd1
3310 LDA #&FE
3320 JSR save
3330 .logd2
3340 JSR zclock
3350 PLY
3360 PLX
3370 STX &8E
3380 STY &8F
3390 RTS
3400 :
3410 .emkey
3420 PHP
3430 PHA
3440 PHX
3450 PHY
3460 TSX
3470 LDA &103,X
3480 CMP #4
3490 BNE emkey1
3500 JSR scan
3510 BRA emkey2
3520 .emkey1
3530 CMP #5
3540 BNE emkey2
3550 LDA #1
3560 BIT flags
3570 BNE emkey2
3580 JSR key
3590 .emkey2
3600 PLY
3610 PLX
3620 PLA
3630 PLP
3640 JMP (oldv)
3650 :
3660 .scan
3670 LDA #&7A
3680 JSR osbyte
3690 CPX #&62
3700 BNE scan2
3710 LDA flags
3720 ORA #1
3730 STA flags
3740 .scan1
3750 RTS
3760 .scan2
3770 CPX #&49
3780 BNE scan1
3790 LDA #1
3800 BIT flags
3810 BEQ scan1
3820 EOR flags
3830 STA flags
3840 .key
3850 LDX &8E
3860 LDY &8F
3870 PHX
3880 PHY
3890 LDX dptr
3900 LDY dptr+1
3910 STX &8E
3920 STY &8F
3930 LDY #0
3940 LDA (&8E),Y
3950 CMP #&FF
3960 BNE key1
3970 JSR stop
3980 BRA key6
3990 .key1
4000 CMP #&FE
4010 BNE key2
4020 INC count
4030 LDY #&80
4040 JSR srfile
4050 LDX data
4060 LDY data+1
4070 BRA key5
4080 .key2
4090 CMP #&FC
4100 BCC key3
4110 JMP break
4120 .key3
4130 CMP #27
4140 BNE key4
4150 LDA #&7D
4160 JSR osbyte
4170 LDA #27
4180 .key4
4190 TAY
4200 LDA #&8A
4210 LDX #0
4220 JSR osbyte
4230 LDA #3
4240 JSR incptr
4250 LDY #1
4260 LDA (&8E),Y
4270 TAX
4280 INY
4290 LDA (&8E),Y
4300 TAY
4310 .key5
4320 JSR setime
4330 .key6
4340 PLY
4350 PLX
4360 STX &8E
4370 STY &8F
4380 RTS
4390 :
```

Continued ▶

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```
4400 .break
4410 BEQ break3
4420 LDX #0
4430 .break1
4440 LDA sbreak,X
4450 .break2
4460 BEQ break2
4470 JSR oswrch
4480 INX
4490 BRA break1
4500 .break3
4510 LDX #0
4520 .break4
4530 LDA hbreak,X
4540 .break5
4550 BEQ break5
4560 JSR oswrch
4570 INX
4580 BRA break4
4590 :
4600 .sbreak
4610 EQUB 30
4620 EQUS "BREAK"
4630 EQUB 0
4640 .hbreak
4650 EQUB 30
4660 EQUS "CTRL+BREAK"
4670 EQUB 0
4680 :
4690 .playon
4700 LDX &8E
4710 LDY &8F
4720 PHX
4730 PHY
4740 LDX dptr
4750 LDY dptr+1
4760 STX &8E
4770 STY &8F
4780 LDY #0
4790 LDA (&8E),Y
4800 BMI po1
4810 PLY
4820 PLX
4830 STX &8E
4840 STY &8F
4850 JMP stop
4860 .po1
4870 LDA #3
4880 JSR incptr
4890 LDY #1
4900 LDA (&8E),Y
4910 TAX
4920 INY
4930 LDA (&8E),Y
4940 TAY
4950 PLA
4960 STA &8F
4970 PLA
4980 STA &8E
4990 PHX
5000 PHY
5010 LDX #emkey MOD 256
5020 LDY #emkey DIV 256
5030 JSR event
5040 PLY
5050 PLX
5060 JSR setime
5070 LDA #14
5080 LDX #5
5090 JMP osbyte
5100 :
5110 .incptr
5120 CLC
5130 ADC dptr
5140 STA dptr
5150 LDA dptr+1
5160 ADC #0
5170 STA dptr+1
5180 RTS
5190 :
5200 .setime
5210 TXA
5220 EOR #&FF
5230 STA time
5240 TYA
5250 EOR #&FF
5260 STA time+1
5270 LDA #&FF
5280 STA time+2
5290 STA time+3
5300 STA time+4
5310 LDA #4
5320 BRA clock
5330 .zclock
5340 LDX #4
5350 .zc1
5360 STZ time,X
5370 DEX
5380 BPL zc1
5390 LDA #2
5400 .clock
5410 LDX #time MOD 256
5420 LDY #time DIV 256
5430 JMP osword
5440 :
5450 .save
5460 LDX &8E
5470 LDY &8F
5480 PHX
5490 PHY
5500 LDX dptr
5510 LDY dptr+1
5520 STX &8E
5530 STY &8F
5540 TAX
5550 LDA #0
5560 TAY
5570 STA (&8E),Y
5580 INY
5590 STA (&8E),Y
5600 INY
5610 TXA
5620 STA (&8E),Y
5630 LDA #3
5640 JSR incptr
5650 PLY
5660 PLX
5670 STX &8E
5680 STY &8F
5690 LDY #0
5700 .srfile
5710 LDA #13
5720 PHA
5730 LDA count
5740 PHA
5750 LDX #5
5760 .srf1
5770 LDA title,X
5780 PHA
5790 DEX
5800 BPL srf1
5810 LDA #0
5820 LDX #12
5830 .srf2
5840 PHA
5850 DEX
5860 BNE srf2
5870 TSX
5880 INX
5890 TYA
5900 STA &100,X
5910 TXA
5920 CLC
5930 ADC #12
5940 STA &101,X
5950 LDA #1
5960 STA &102,X
5970 LDA &F4
5980 STA &103,X
5990 LDA #data MOD 256
6000 STA &104,X
6010 LDA #data DIV 256
6020 STA &105,X
6030 CPY #&80
6040 BEQ srf3
6050 LDA dptr
6060 SEC
6070 SBC #data MOD 256
6080 STA &106,X
6090 LDA dptr+1
6100 SBC #data DIV 256
6110 STA &107,X
6120 .srf3
6130 LDY #1
6140 LDA #&43
6150 JSR osword
6160 TSX
6170 TXA
6180 CLC
6190 ADC #20
6200 TAX
6210 TXS
6220 INC count
6230 .reset
6240 LDX #data MOD 256
6250 LDY #data DIV 256
6260 STX dptr
6270 STY dptr+1
6280 RTS
6290 :
6300 .data
6310 ]
6320 NEXT
6330 ENDPROC
6340 :
6350 DEF FNsaverom
6360 L%=data-rom:T%=0
6370 FOR I%=0 TO L%-1
6380 T%=T%+code?I%
6390 NEXT
6400 IF (L%<>1091)OR(T%<>135082) P
RINT"Error - check code":=FALSE
6410 OSCLI("SAVE KLrom "+STR$~code
+" "+STR$~L%+" 0000 0000")
6420 PRINT "ROM code assembled and
saved"
6430 =TRUE
6440 :
6450 DEF PROCinstall
6460 PRINT "Install ROM in sideway
s RAM (Y/N)? ";
6470 REPEAT
6480 G%=GET AND &DF
6490 UNTIL (G%=ASC"Y")OR(G%=ASC"N"
)
6500 PRINT CHR$(G%)
6510 *SRLOAD KLrom 8000 4
6520 ?&2A5=&82
6530 PRINT "KeyLog installed"
6540 PRINT "*KLON to switch on"
6550 PRINT "*KLOFF to switch off"
6560 PRINT "*KLPLAY to replay"
6570 ENDPROC
```



COMPUTER CONCEPTS PRESENTS

## A better word processor

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*Supplied with the new outline font manager†, Impression is capable of producing outstanding quality prints on everything from dot-matrix printers to typesetting machines.*

*The first word processor designed for RISC-OS - it multi-tasks with other applications and supports direct, in-memory data transfer to and from other RISC OS applications. For example to import a diagram from Draw, you can simply drop its file icon onto an Impression frame - the diagram is then immediately transferred to Impression. The same applies to !Edit and !Paint and other RISCOS applications.*

*Impression is a fast and compact program and so is ideally suited to a 1MByte machine. It is extraordinarily powerful - able to handle ALL documentation needs from simple one sided letters to the most complex magazine layout. Unlike traditional DTP systems, Impression is not only capable of handling long documents, but does so with ease. Yet it is not a complex program to use - considerable attention has been paid to making Impression simple to learn and easy to use.*

*The creators of Impression come from a background of word processor design that includes some of the most successful word processors ever produced. They are also the originators of the most advanced application programs for the BBC micro and the authors of the best selling word processors for this machine over a period of 8 years.*

*† Fonts licensed from Acorn Computers*

IMPRESSION

## The Word Wise

*This is a frame based word processor. All text and graphics occur within rectangular frames, which may be positioned anywhere on the page and be any size up to the full page. Frames may be re-sized and re-positioned at any time just by moving the mouse pointer to the frame and dragging. Frames can be thought of as two dimensional rulers controlling not only the left and right but also the top and bottom margins of the text.*

*Text can be made to flow from one frame to any other on the page, or on other pages - this happens automatically as frames are re-sized or the text is edited or altered. In this way text may be formatted to multiple columns or indeed into multiple sections at any position on the page.*

*Impression provides total support for frame manipulation. Options include a variety of border types - to liven up the page, or to put a box around some text etc. Frames may be displayed transparent (objects can be seen under the frame) or with any colour background. One other special feature of frames is the text repel option. This forces text to flow around certain frames (containing graphics for example). Unusually Impression allows (if required) text to flow around BOTH sides of a graphic frame, rather than the more conventional approach that normally restricts text to flowing to ONE side of the graphic.*

**Automatic re-formatting, re-pagination and text flow**

*Impression keeps the current document totally up to date so that it always exactly mirrors the final printed output. Text is continually, automatically re-formatted as it is edited or altered. There is never a need to issue re-format commands or select re-pagination menu options as is the case with many other word processors. Unlike other DTP systems Impression also allows the text and the cursor to flow from frame to frame and from one page to the next unhindered. For users this means that they can simply type and continue to do so without any regard for frame order or for page breaks etc. Impression copes with it all.*

**Graphics**

*Word processors that cannot include graphics on the page are severely restricted and word processors that do support graphics are usually limited to the placing of a simple sprite on the page which cannot be altered.*

### The Facts

- *Multiple windows on any document.*
- *Multiple documents in memory at once*
- *Spell-Master spelling checker included*
- *Totally integrates with RISC OS*
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- *Scaled print - by any percentage amount*
- *Rotated print (e.g to fit 2 A5 pages on A4)*
- *Graphics aspect ratio lock (to any value)*
- *Graphics scale and crop*
- *Fast character mode printing*
- *All controlled by only 5 main menus*
- *A specially designed Greek font included*
- *Inter-Word & First Word® loaders*
- *Full European character set*

*Page 1*




## The Archimedes document processor

***Spelling checker***

Impression is supplied with the Spell-Master interactive spelling checker. This supports a 60,000 word English dictionary, check as you type, dictionary browse, user dictionaries, ignore dictionaries etc. This also has a highly intelligent "guess" word facility. If you misspell a word, or simply mistype it, the computer will bleep. By pressing one key a small window is displayed listing words that it thought you meant to type; clicking on the appropriate word will then replace the incorrect one in the text (and any other occurrences of the word). In practice this usually lists only one or two words and has achieved in tests a success rate of over 90% in guessing the one correct word straightaway.

***Abbreviations***

Impression allows the user to keep a list of words or phrases and their abbreviations, and will expand any typed abbreviations to the full text, So, for example, you could type 'CC' and get Impression to automatically change this to 'Computer Concepts' - as you type.

***Hyphenation***

In addition to abbreviation expansion, Impression automatically hyphenates words as you type using some advanced word splitting algorithms. This is particularly important for printing multi-column documents. A hyphenation exception dictionary is provided allowing precise control over the hyphenation points of any specified word.

***Character Mode***

Impression can be used as a straight forward word processor and in addition to the RISC OS printer drivers (licenced from Acorn) a set of character mode printer drivers are included allowing Impression to drive printers using their built-in character sets. It therefore offers the best of both worlds - high precision, high quality DTP-like prints or fast, traditional, character based word processing.

***Automated index generation***

Any word or phrase may be selected to appear in the index and by selecting one menu option an index is created at the end of the document listing all references, by page number, to these words or phrases.

***Measurements***

Impression can display or accept measurements in a large variety of situations. For example, the frame size and position, ruler measurements, text size, line spacing etc. etc. In all cases Impression can display or allow the user to enter these measurements in a variety of unit



## Scan-Light

Twiggy

Twiggy in the 60's

*Scan-Light*

The Archimedes image scanner.

The above images were 'grabbed' using the Scan-Light 200 dpi scanner. Although this is only a monochrome scanner, a special software anti-aliasing feature can convert any monochrome scan to a 16 grey level image. Such grey-level images are ideal for incorporation into DTP products since they can be scaled to any required size without suffering from any patterning effects that usually afflicts less capable scanning software.

This document is created, edited and printed from Impression, the new document processor.

*This entire page was produced on a 1200 dpi typesetter, direct from Impression.*

IMPRESSION

THE DOCUMENT PROCESSOR FOR THE ARCHIMEDES
A BETTER WORD PROCESSOR

The Archimedes is a very powerful computer and Impression makes full use of this power. This doesn't just mean that Impression provides more facilities but that, in addition, the conventional word processing features are implemented in a faster, more natural, more fluent way than was ever possible before.

This is a completely new design for a word processor. It may contain influences from other products on other machines, but it is not a conversion from a product designed for other machines. It has been created from scratch to be as advanced, as flexible, as adaptable and still as simple to use as any product, on any machine.

Impression is more than a word processor, it can handle complete documents ranging from whole books, newsletters, or technical articles, to single page advertisements. It can handle all aspects of the final printed result - the text, line graphics, photographs, company logos etc. Yet it can still be used to bash out a single page of text as well as any 'simple' word processor. It is a document processor.

The creators of Impression come from a background of word processor design that includes some of the most successful word processors ever produced. They are also the originators of the most advanced application programs for the BBC micro and the authors of the best selling word processors for this machine over a period of eight years.

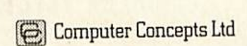
## Programmers

Computer Concepts is looking for programmers to join the team at Gaddesden Place to assist in the development of a range of new hardware and software projects.

Knowledge of assembly language programming (any processor) is necessary and, although not vital, it would be an advantage to have some experience of Acorn machines.

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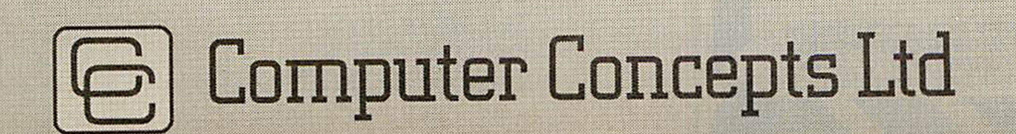
For any further details contact Catharine Moir at:




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Tel (0442) 63933. Fax (0442) 231632

*Which program can produce these pages **and** handle a 500 page document with ease, on a 1 Mbyte machine ?*

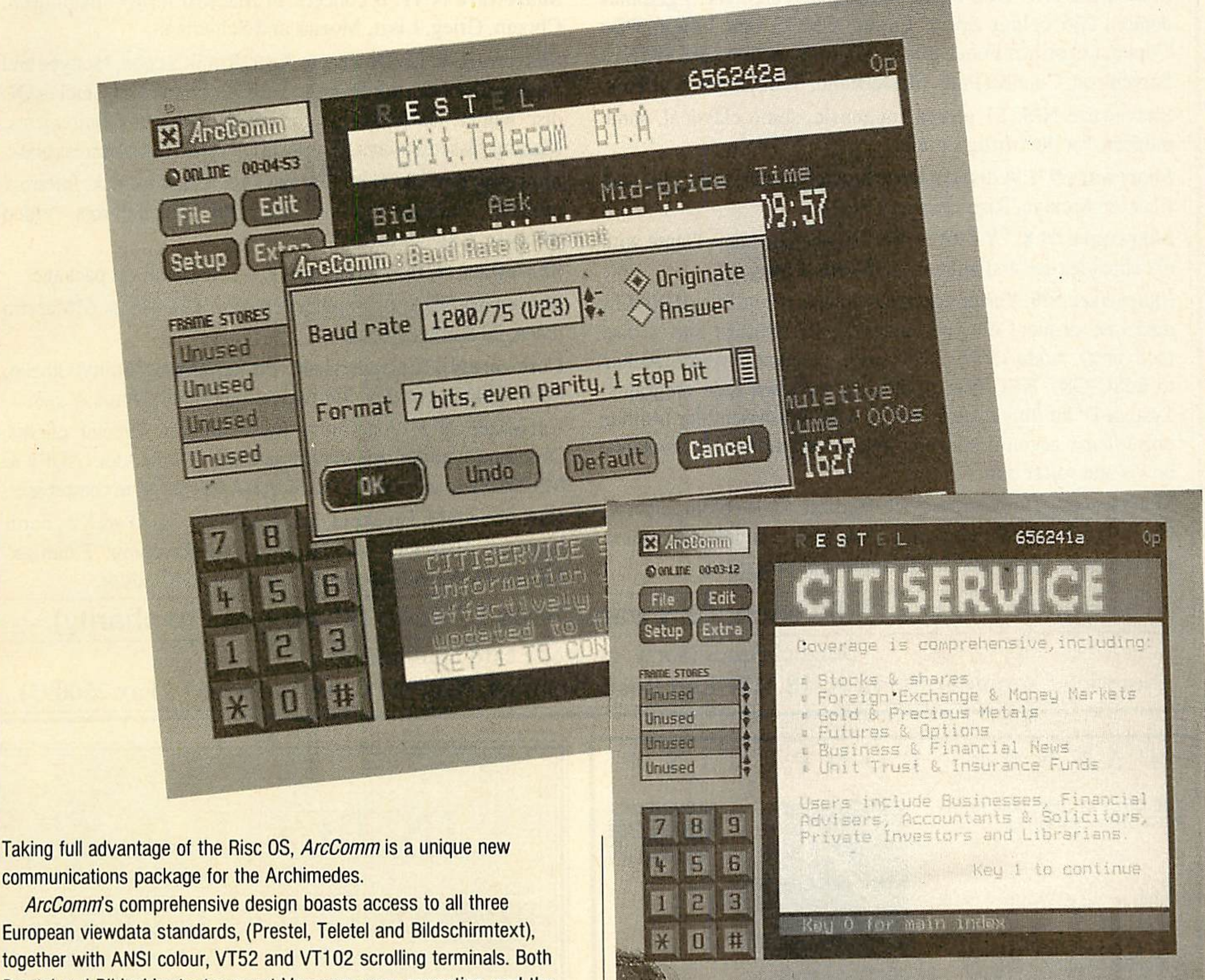
The Archimedes from Acorn Computers.
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# OFFERS

## ARCCOMM




Taking full advantage of the Risc OS, *ArcComm* is a unique new communications package for the Archimedes.

*ArcComm*'s comprehensive design boasts access to all three European viewdata standards, (Prestel, Teletel and Bildschirmtext), together with ANSI colour, VT52 and VT102 scrolling terminals. Both Prestel and Bildschirmtext support Vasscom error correction, and the VT102 terminal offers 132 columns, and smooth scrolling. Full coverage of international character sets is included.

The package has been produced with ease of use as a priority. All screen displays are clear and uncluttered, with pop-up menus and dialogue boxes making control as simple as possible.

You won't have to remember strings of numbers! Its telephone number list allows you to dial and log-on automatically. You can store viewdata frames while on line, edit and upload mailboxes, and load/save frames or screens onto disc.

While communicating, it makes use of the full screen, rather than running in a desktop window. But you can return to the desktop at any time, and *ArcComm* remains running as an icon on the icon bar. You can use other desktop software while *ArcComm* stays on-line but inactive. And clicking on the icon brings back full-screen communication.

You can automate the log-on sequence for any comms service, by using *ArcComm*'s own procedure language. This allows you to log-on, set up the correct terminal emulation and all your preferences through a single menu selection.

*ArcComm* supports Hayes, DTI and manual modems, with details of how to write drivers for other modems in the User Guide provided. You will need Risc OS to use the package, and 1 Mbyte or more of memory. The package costs £29.95.

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# EUROWORD

## for WORDWISE and WORDWISE PLUS

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| French/Ital | German | Spanish |
|---|---|---|
| à ç é è ù ò l | Ä Ö Ü ä ö ü ß | Pt ¡ Ñ ¿ ñ ç |

Additional accented characters are easily produced by overprinting a UK character wth an accent as in ê. Euroword supports a range of printers including Epson type dot-matrix, Diablo 630 printwheels and the IBM extended character set.

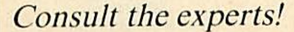
**"Wordwise-using modern language teachers should fall on Euroword gratefully" – Times Educational Supplement, 3 Feb 89.**

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# COUNTING THE DAYS

**David Acton finds out how organised he would be with the Desktop Diary from Quercus**

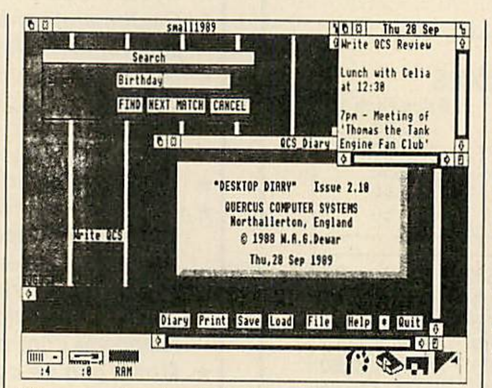
The *Desktop Diary* from Quercus computer systems is a Risc OS compatible application that provides you with a planner for the full year ahead.

Each day of the year is represented as a small rectangular space on a large window. Selecting any date will provide a small text window into which you can type your appointments.

The window for 'today' is displayed immediately the application is loaded.

Standard Risc OS menus are not used. Instead there is a rather intrusive menu box containing buttons. These are used to load and save diaries, print out their contents and open a help window. There is also a star command option.

Indeed, the whole package has rather a non-standard feel. This would be forgivable in many cases, but diary programs will be used alongside everything else and




**It's easy to check forthcoming events**

should blend in a little better than is managed by this offering.

It is suggested that the diary be viewed in mode 16. This provides a full view of the whole year (just about).

Incidentally, selecting a 256-colour mode shouldn't make any difference to a well behaved application but the *Diary* gets its colours wrong and chooses to use some very odd hues.

Printing facilites are quite good – a printer driver generator is included if you don't have an Epson. You may select which months to dump out and whether you need a full or summarised output.

Clicking Adjust on the main diary window causes a small search window to appear. This allows you to scan through the diary for a particular string.

If you're the sort who likes everything in your life to be on disc, the *QCS Diary* might well suit your needs. It's a comprehensive enough little application and, though not stunning, is a considerable improvement on those lumpy leather-bound filo-thingies.

QCS Diary *costs £14.95 from Quercus Computer Systems, Courtyard House, North Otteringham, Northallerton D17 9EP.*

# THE SHOPPING BASKET

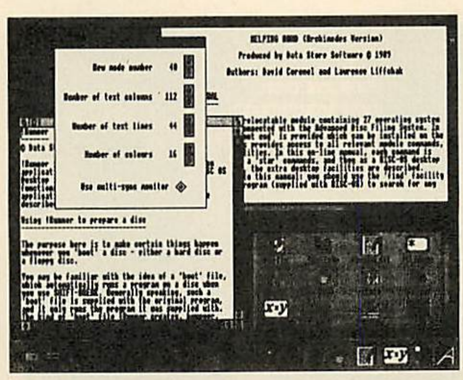
**Rob Miller examines just some of the goodies to be found in this pack from the Data Store**

One of the best features of the Risc OS desktop is the ease with which you can append your own utilities. Small programs are appearing every day, the latest of which is a collection of utilities from that well known computer shop in Bromley, The Data Store.

The disc consists of nine useful applications with a couple of 'interesting' ones.

First off (in no particular order) is a desktop front-end for the Basic Editor. Clicking on the application file installs the Basic Editor module in memory and displays an icon on the menu bar. Editing Basic programs is now just a case of dragging the relevant file on to the Editor icon. The Editor is then entered, using the whole screen rather than a window. The mouse can be used to move the cursor around the program.

A Command Line Interpreter Menu allows you to build up a list of chosen star commands that can be accessed without using the Star prompt. Useful names can be given to each command, ie 'Mods present?' could activate the *ROMOD command that lists all modules and tells if they are unplugged, dormant or active.



Data Store utilities lend a helping hand

Helping Hand provides a series of disc (hard and floppy) related utilities such as archiving and file management.

Tiny Dirs on the Risc OS application disc 2 can be useful although it would be better if the status could be saved. Logger provides this facility.

Mode customising is made simple with ModeMaker. New modes can be created by specifying the number of characters heightwise and lengthwise, tested and then saved as relocatable modules.

Other utilities include a Risc OS filer end for the Computer Concepts' Rom/Ram podule, an 'advanced boot file' creator and an Arc/Z88 transfer program.

Each item, sold separately, could cost anything up to £10. The Data Store is charging £14.95 for the lot. Any user of Risc OS should get a copy now!

Data Store Utilities *costs £14.95 from The Data Store, Chatterton Road, Bromley, Kent.*

# TAGGING ALONG

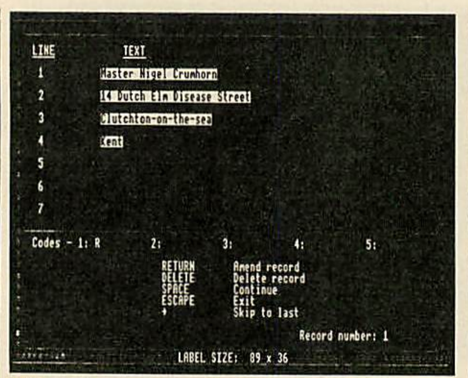
**David Acton can't complain about this label printing package from Labelwise**

*LabelMaster Plus* is a label printing application for the Archimedes from Labelwise, a company which already supplies versions for BBC Master machines.

This is not a true multi-tasking application but takes over the machine when run. A menu is displayed from which various options and sub-menus may be selected using the numeric keys.

Labels may be defined individually or in groups for mailshots and the like. Entry of labels is very straightforward. Each line of text is typed after specifying the style required (enlarged, pica or condensed). Once done, you have the option of correcting any mistakes you have made prior to saving or printing.

A good feature of the program is its support of Epson compatible colour printers. Another useful option is the ability to print (and review) selected labels only. Although you shouldn't expect the sophistication of a database, these limited facilities do extend the scope of an otherwise fairly bland program.




**It's got a non-standard appearance**

File handling is a little peculiar. I transferred the application to my hard-disc with no problems but all label files are held within a sub-directory of LM+ – the application directory. You can see what files are available by selecting 'catalogue disc' from the menu.

So, is *LabelMaster Plus* good value for money? Well, I hesitate to say no in the absence of any similar packages. I'm not aware of any competing programs and so if you're really in need of a label-printing application it's got to be this or nothing.

*LabelMaster Plus* does have the feel of a 'souped-up' Master program, though. It doesn't conform to Risc OS in any way at all and although not difficult to use could be improved in a number of ways.

It does do its basic job quite well. As for value, the price of £29 is rather steep for what it does but then, if there's nothing else, I can't really complain – can I?

LabelMaster Plus *costs £29 from Labelwise, 17 Ingfield Terrace, Slaithwaite, Huddersfield HU7 5BJ. Tel: (0484) 846126.*

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For Archimedes owners, there is an introduction to the 68000; the processor used in the Amiga, Atari ST and Apple Mac.

If you want to record a sequence of key presses our *Keylog* program will save every movement of your fingertips in sideways Ram. Hints and Tips includes the usual selecton of helpful utilities and routines for all the Beeb owners. ADFS to DFS, Master Edit and printers are all covered.



All the Arc owners out there can brighten their screens with a mystery colour screen fill, or learn how to construct their own Risc OS applications.

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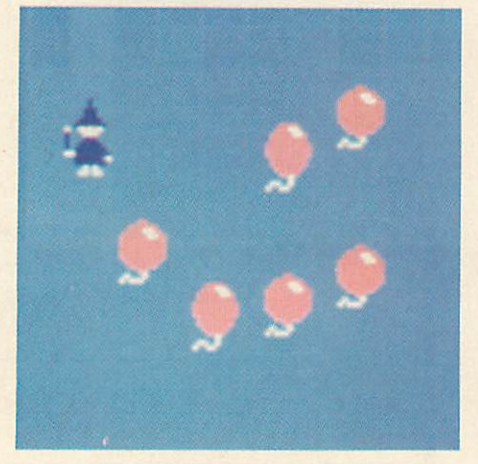



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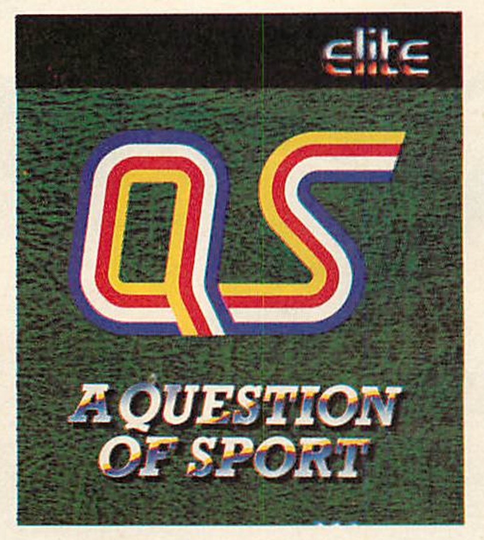
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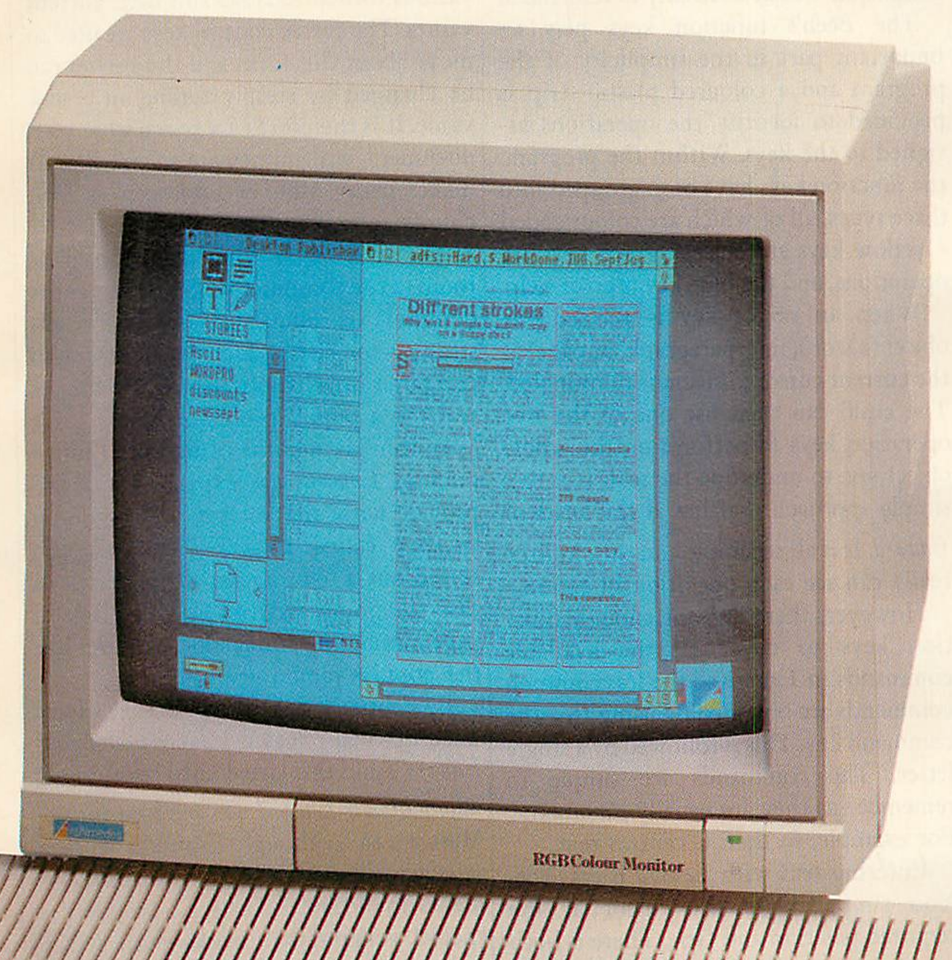
This is a complete system – computer, monitor, DTP software and laser printer.

The computer is of course the Acorn BBC A3000, complete with an extra 1Mb of memory to make it the ideal micro for DTP work, and worth £975. The monitor is Acorn's own colour monitor for the Archimedes range, worth £253.

The DTP software is Acorn's DTP package worth £150. This professional program allows text and graphics to be combined to produce complete pages on screen and output to your printer. See the October 1989 issue of *BAU* for a full review of this software.

To add cream to this mouth-watering prize is Panasonic's KX-P4450i laser printer. This Laserjet compatible printer offers 300dpi printing at 11 pages per minute from its two paper bins.

The KX-P4450i is also Epson, IBM and Diablo compatible and comes complete with both serial and Centronics interfaces. Full control is provided by the comprehensive front panel. This top-notch machine is worth nearly £2000.




To win this amazing prize, all you have to do is answer some simple questions on print and publishing (see below).

But don't send us the answers yet! Jot down your solutions and jealously guard this copy of *BBC Acorn User*. You will need the coupon at the bottom of the page to enter the competition.

Next month we will publish another three questions and in the February issue there will be three more. Each issue will also contain a coupon and all three must be collected to enter the competition.

You will have until 31 January 1990 to send in all your answers along with the three coupons.

Seal the coupons in an envelope and on the back write your answer for each question next to the question number.

Also write your own name and address on the back of the envelope and state what micro (BBC B/B+, Master 128, Compact 128, Master Compact, Archimedes or BBC A3000) you own.

The first correct entry out of the hat after the closing date will be the lucky winner of the complete system.

This competition is open to all readers of *BBC Acorn User* resident in the UK excepting employees of Redwood Publishing, Acorn Computers and Panasonic. The judges' decision on all matters concerning this competition is final and no correspondence will be entered into.

a) Who invented the printing press?
b) What was the first book to be printed?
c) Who invented the fountain pen?
d) Which newspaper was the first to use a Linotype typesetting machine?
e) In what year was the first electronic typewriter sold?
f) What is an Adobe?



# FROM LITTLE ACORNS

**Dave Futcher assesses classroom wordprocessing packages for young writers**

As soon as children first start to write with pencil and paper, they begin to change their minds – they alter things and cross out. However, children hate working on a messy page.

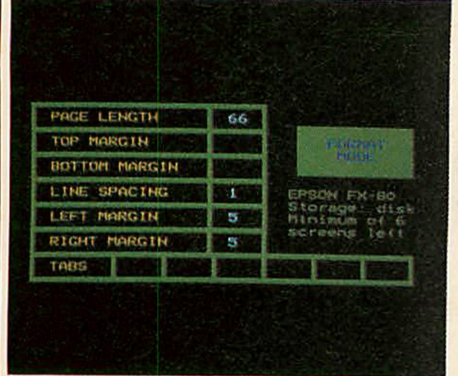
We have all experienced the scene where a few words are written, the first mistake is made and the child crumples up the paper and starts again.

Using a wordprocessor makes things so different. It is so easy to correct mistakes. More important is the 'professional' looking print generated by the computer which adds to the child's general interest in writing.

For too many children the process of learning to express themselves in writing is still tedious and laborious. The facilities of a wordprocessor make writing physically easier for children.

However, wordprocessing remains in its infancy in our schools but there is a wealth of educational wordprocessing software available.

## The pupils processor




Towards the end of 1983, the first wordprocessor especially designed by teachers for children appeared. It was *Edword*, a 16K Rom package with outstanding documentation and remarkable support material.

*Edword* was developed by the MEP, by educationalists who had particular experience in teaching secretarial skills and of computer based curriculum development.

The package became particularly popular in schools. It was easy to use and user friendly and had a set of comprehensive commands which were easy to remember.

The Beeb's function keys play an important part in the simplicity of the program and a coloured plastic strip is provided to identify the operations assigned to the keys. Within the program, the function keys have been grouped into three types, all of which are colour coded – yellow keys are objects, green keys are operations, and the blue key is error help.

When an object key is pressed the object (a word, line, paragraph, or page) at the current cursor position is illuminated. The child can then use one of the five operation keys to perform on the whole object say, to underline the text. It is this simple approach that lies at the heart of *Edword*. It is all so simple and the children really can see each operation in action.

However, there are not enough function keys to cover all the available commands in *Edword* so the less common commands are obtained by using f9 – the command key. This is followed by a single letter. The commands are simple to remember as they are usually mnemonic. For example, f9 then C centres text.

Entering text with *Edword* is easy too. You simply place the cursor at the required position and type. There is both an overtype and insert mode. There are actually three editing modes – Create, Revise, or View. For each of these the screen is split into three distinct areas. The document is displayed in the central document window which shows the portion of the text you are working on.

At the top of the screen is the system status area, which displays the document name, current mode, current position of the cursor, left and right margin settings, tab settings, current indent and a number of print style indicators. At the bottom of the screen is the command area. This is used for error messages and in certain operations for entering data.

The Format mode is one of the most impressive features. In this mode, the screen displays a form showing the various format settings and their current values. The cursor control keys are used to move about this form and the entries can be changed by simply typing in a new value. It is therefore easy to see what your document will immediately look like. It makes many other wordprocessors look clumsy in comparision.

The idea of working from the classroom to the computer with teachers as the designers is unquestionably the right strategy for curriculum development in computer based applications, and *Edword* really is a pupils' processor.

Within six months of its initial introduction *Edword* was expanded and improved with the release of an add-on package called *Edword Plus*. This also sorted out a few niggles like the lack of case swopping facilties and the lack of page numbering and it added features like the popular jumbo printout.

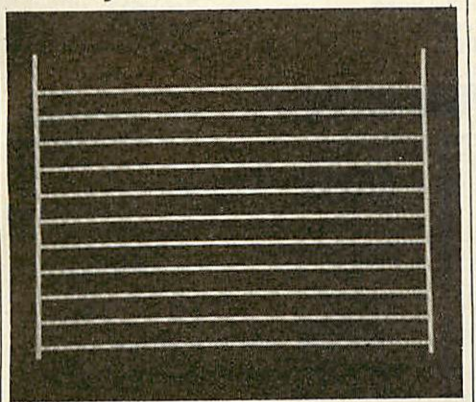
By February 1985 the publisher Clwyd Technics had released *Edword*'s successor *Edword 2* and this lasted until last summer when *Master Edword* was released for the Master 128. Although *Edword 2* worked satisfactorily on the Master 128, developments in Western Australia produced a special version that works with ADFS only and uses sideways Ram for loading in the package's Rom image and most of the additional commands previously loaded from the application disc.

## Simple as the pen

Alongside this early but outstanding educational wordprocessor there were a number of much simpler wordprocessing package available for the younger user. A firm favourite for some time was *Primary Pen* from GED Software

*Primary Pen* is not feature-laden to the extent that it complicates writing at the loss of creativity. The intricacies of wordprocessing came second to creating text in the form of stories.

## As easy as ABC



Another early educational wordprocessor for the BBC micro is *ABC*, written by Daniel Chandler and published by Acornsoft in Home Education series, it was designed to be easy to operate and quickly understood by young writers aged seven upwards. It is often described as a 'learner's screen writer'.

*ABC* has three screen displays which offer different facilities for writing and manipulating text. Write, Read and Write and the Slate.

The Slate is probably the most innovative feature which offers basic notebook facilities at the top of the screen and it can be used to jot down ideas and notes, experiment with word shapes or synonyms or to try out spellings without affecting the main text. COPY will copy over text from the slate to the lower writing area.

On the strength of such innovative and varied features, *ABC* won the Educational Publisher's awards for the best educational software package in 1985.

## Language processor

*Alpha* is another educational writing tool and it is described as a language processor rather than a wordprocessor.

Developed at the Advisory Unit in Hatfield (the home of the *Quest* database package) *Alpha* is a command driven package offering the full range of wordprocessing facilities and will handle very long documents.

A little like *Wordwise Plus*, *Alpha* is capable of being extended and configured to suit a variety of needs. It has a full set of resident commands to which user-defined commands can be added.

The program supports a 'lexicon' which can be personalised and provides access to 2000 words. The lexicon is ideal for storing words that you know but cannot think of when you want to use them, and for holding whole groups of specialist words. Of course it can also be used as a spelling aid. *Alpha* also has a temporary text store slate for detailed editing or cutting and pasting sections of the text together.

The package will print in bold and wide print on most printers and for young children it also offers large text.

## Basic freedom

```
We had our last swim of the holiday
on the beach. The holiday was
nearly over. It had been great.
Everybody had really enjoyed it, even
Dad who really can't stand the sun.

Mum made lots of sandwiches for the
trip home. Jim packed it all up in a
basket. We all got in the car and off
```

One of the greatest successes of the now defunct MEP and in particular its National Primary Project was the free software. In the Infant and First School's INSET pack was *Writer* – a super little basic wordprocessor originally intended for use with very young children.

*Writer* is supplied with a Concept Keyboard option so five year olds could use it with none of the problems associated with the Qwerty keyboard. *Writer* is also a good introduction to wordprocessing for older children. Until *Folio* arrived, *Writer* was the mainstay of infant and junior school wordprocessing in many schools around the country.

*Writer* displays large letters on the screen and uses a simple menu to control loading and saving of files. It also has search and replace and printout facilities.

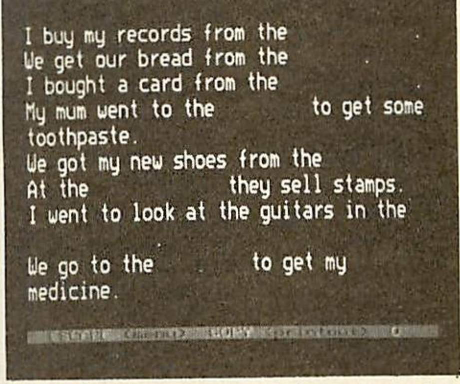
The main drawback of the original *Writer* was it could only print in basic computer type unless the teacher went to quite a bit of effort to set up the printer in another way. However, it did not take long for Nottinghamshire LEA to do its own upgrade which added a new front end with a printer setup that enabled the child to choose from single or double height, italic and NLQ.

The summer of 1989 saw the release of *Stylus* from Micros and Primary Education (MAPE). *Stylus* was a collaboration between the Manchester Semerc and Stransmills College and took the original *Writer* to dizzy new heights.

*Stylus* expanded the range of print sizes and added the choices of light, medium or dark and plain, italic, Tech or Boarder.

But most exciting was the 'talk' option it has which lets the children hear *Stylus* attempt to tell the story written. The package uses Superior Software's *Speech!* software which is included free on the distribution disc.

## Word support



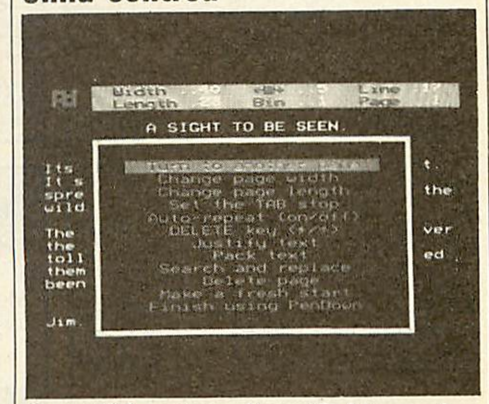

Another educational wordprocessor that originated from the MEP is *Prompt*. This was produced at the MEP Special Needs Software Centre in Manchester.

*Prompt* can best be described as a supportive wordprocessor that aims to give the maximum of help to those who have difficulty in getting their ideas and thoughts down in writing. It can also be used as an introductory wordprocessor.

The final MEP version was *Prompt3* which cames with one of the best educational computing user guides published – *101 ways of using Prompt3*. Most of the ideas relate to using *Prompt3* with the Concept Keyboard and an overlay of whole words, complete sentences or graphics. This enables whole-word wordprocessing and is particularly effective for children with special needs.

The most recent version of *Prompt* was published by the MESU is 1987 in a package called *Prompt Writer* which contained the upgraded versions of both the earlier packages.

## Child centred




In 1986 Logotron diversified its product range from just Logo to publish *Pendown*, created by Peter Hunter.

*Pendown* is called a 'child centred wordprocessing environment' and cer-



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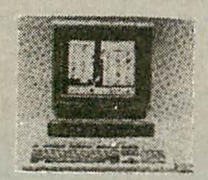
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tainly provides a rich variety of facilties selected by function key and pull-down bar menus and sliding bar cursors.

These menus give the children a great deal of control over the shape of the text with page and line length settings, justifcation and centring on the screen, search and replace, cut and paste. Margins cannot be set, although the line-length can be altered.

The initial *Pendown* package is provided with four fancy fonts (Gothic, Chunky, Moderna and Horizon), a standard jumbo type and a font editor – so it is possible for children to explore different possibilities, create their own typefaces or modify existing ones.

Teachers will particularly like the help files which can be ceated to help children to master *Pendown* or to relate to the writing task that has been set. Help is instantly displayed on part of the screen in a pop-up window when a function key is pressed.

The *Pendown* dictionary is also a great asset for children. This provides a list of words which can be reached in two ways, alphabetically and by groups. A 'starter dictionary' is provided but this is only the beginning – all *Pendown* users are expected to build their own dictionaries and special word lists.

Logotron has published two additional sample dictionaries for children to use with the program. They are called 'Ponds' and 'Romans' and can to be found in the *Pendown Extra* package.

The 'ideas processor' is another powerful feature of *Pendown*. This can be developed into a tree-like database of headings and subheadings to a depth of 10 levels. Whatever is produced in this planning aid can be saved and loaded or transferred into the *Pendown* text area and 'fleshed out'.

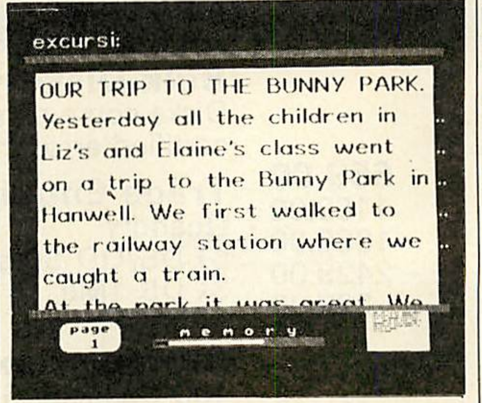
About a year after the release of *Pendown*, Logotron followed it up with *Pendown Toolbox*.

As its name suggests the emphasis is on practicality and this follow up includes 12 new fonts, an improved font editor and an outstanding signwriting package using the large fonts.

*Pendown* is probably the best bridge between childrens' wordprocessors and the 'real thing'.

It's not quite as suitable for infants as either *Writer* or *Folio* – but it is an ideal package to take children from the nine years old stage right through to the middle of the secondary school.

## Outstanding words




By the end of 1986, another attempt at the infants' wordprocessor was published. *Folio* was developed by a team of programmers working with teachers from three Local Educational Authorities – Coventry, Ealing and Hampshire. After two years of research and extensive trials in the LEAs, the package was released.

The result was a truly child-centred wordprocessing system that provides everything schools will want. On the one hand it is an ideal package for children to start with but when users begin to delve inside *Folio*, they find it is also a real wordprocessor that is versatile and just as suitable for the teacher and older pupils.

*Folio* is not just an English wordprocessor either. There are also European and Asian versions, that have the same structure to them.

At the heart of *Folio* are simple on-screen menus that lead into the various facilities at the press of a key. When writing with *Folio*, the child sees and uses characters that are always correctly shaped and spaced, which means the written work on the screen is large and easy to read. Instead of the usual flashing cursor *Folio* uses a pen cursor to show the user where they are. Teachers were considerably involved in character design and the user interface and it shows.

Because of the large characters used on the screen *Folio* is certainly not a Wysiwyg wordprocessor but in the right hand bottom corner of the screen it does have a display of how the text will appear on paper when it is printed out and this helps pupils with their layout.

Instead of the more usual word count, *Folio* uses a memory meter which shows the child the amount of space left in the computer for their work – another clever touch in a package full of the very best features in any educational wordprocessor on the market.

The on-screen text is faithfully reproduced on paper. The print option allows for output as large, medium or small characters in a range of fonts. There are a couple of nice cursive scripts, a newspaper typeface, another called Fine, one called Bond and as expected there is one called Folio. Altogether there are eight fonts which can each be printed in the three sizes.

*Folio* offers the highest quality of printout available on an Epson compatible printer and double and triple strike modes which put most NLQ to shame.

*Folio* also has a simple text layout and some example templates are supplied such as a page for writing the school magazine. Especially for infants there is one called Story Book which has 15 lines to the page with the text centred. It is even possible with *Folio* to print the text to a particular shape – like a circle.

Like *Writer* and *Prompt*, *Folio* can also be used with a Concept Keyboard. It even offers the facility to make keyboard overlays and you can even import files from *Prompt* which means *Folio* is an ideal tool for children with special needs.

After a protracted delay, in 1988 Tedimen finally released the *Advanced Folio* package – a considerly improved version with a number of added features.

*Advanced Folio* offers lots of new fonts, and a new NLQ size. Some 27 fonts are available with up to eight at any time. The facility to print all the way across the page in all four print sizes when the full page layout is selected is a real boon with a special menu for fixing margins.

Another bonus is the inclusion of a batch printing facility that allows different formats to be printed on the same page. This is idea for producing text with a large headline, a medium subheading and three-column small text.

Edword 2 *costs £39.95 and* Master Edword *costs £25 from Clwyd Technics, Unit 4, Antelope Industrial Estate, Rhydymwyn, Near Wold, Glwyd CH7 5JH*
Alpha *costs £30 from the Advisory Unit, Endymion Road, Hatfield AL10 8AU*
ABC *costs £9.95 from Acorn dealers*
Primary Pen *costs £9.95 from GED Software, 70 Stoke Road, Bletchley, Milton Keynes.*
*Pendown costs £34 from Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ*
Folio *is available on licence to LEAs and* Advanced Folio *costs £25 from Tedimen software, PO Box 23, Southampton, Hants S09 7BD*
Prompt-Writer *is available from the MESU.*
Stylus *is available from MAPE*

# RHYTHM AT YOUR FINGERTIPS

**Rob Miller checks out *Rhythm Box*, the Archimedes' answer to Buddy Rich**

EMR was the first software house with a music package specifically for the Archimedes computer. *Soundsynth* promised to be the first of a number of programs that would go to form the complete *Arpeggio* Music System. Since then, several other parts have been released including the aptly named *Rhythm Box*.

The ability to store sampled sounds coupled with its fast processing speed, makes the Archimedes an ideal computer on which to implement a drum machine.

Adding to this the fact that it's possible to have eight separate stereo voices playing at once, makes the Arc look as though it was custom-built for the task.

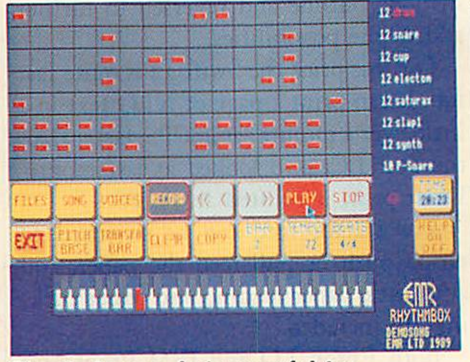
*Rhythm Box* comes on one disc and includes the program itself, plus a host of different percussion noises. Everything from bass drums to hi-hats has been sampled. For those not satisfied with the sounds provided, extra noises can be pulled from a range of *Creations* discs sold separately by EMR. It's perfectly possible to have a whole farmyard 'getting on down' in your own living room.

On booting the disc from the Risc OS desktop (in a rather roundabout way) you are presented with a fancy title sequence and then *Rhythm Box* itself.

The screen is split into roughly two areas. The top part usually contains a grid (number of beats × number of instruments) representing a single bar, into which the drum pattern is written. Below that are a set of 'buttons' that control various aspects of the program.

Help text is displayed at the bottom of the screen, depending on the position or use of the pointer at any particular moment. This can be turned off if required. A four octave keyboard forms the rest of the screen display.

*Rhythm Box* is the sort of program you would want to use straight away, without the need to set up various parameters and the like. Fortunately you can, just by clicking on the Record button. A small light flashes to signify recording is taking



**Simple to use, but powerful too**

place. Notes can be entered by selecting the desired pitch on the keyboard and then marking a square in the grid. Notes can be deleted by clicking on the note to be removed. The current bar is played in real time (as you record it), so there is no need to constantly stop and rewind.

When the program first boots up the default Archimedes sounds (StringLib and Percussion) are used for the instruments. These are all right but for realism, a set of sampled percussion sounds and other effects are provided with *Rhythm Box* for your use.

These include bass drums, snares, bass guitars and even a few human voices.

With the samples installed and the sound being played on a stereo amplifier, *Rhythm Box* transforms from a toy to a semiprofessional drum machine. The addition of MIDI output would have pushed it even further, although this is sadly lacking. Maybe something for release two...

As mentioned above, *Rhythm Box* comes across best when played through a stereo amplifier. The stereo position of individual notes can be adjusted allowing for some quite amazing panning effects. The volume of each note can also be changed separately.

Once a satisfactory rhythm has beeen devised you can stop the recording, move to the next bar and then begin recording again. Any number of bars from one to 128 can be programmed, each consisting of up to 128 notes.

When all the bars you want have been programmed, the whole lot can be arranged into a song. Songs are effectively a series of instructions telling *Rhythm Box* which bars to play and in which order.

Bars can be repeated singly or in groups of bars with looping. Songs can then be saved to disc via the file button. All instrument lines are saved and reinstated upon loading.

*Rhythm Box* makes an ideal introduction to sequencer type software. It's simple to use but comprehensive and powerful at the same time.

The front-end (what's on the screen) looks a little crude compared to similar 16-bit packages and detracts from the overall 'professional feel' of the software. This problem is purely one of appearance and does not really affect the way in which the package operates.

The addition of MIDI output and perhaps, a Risc OS (multi-tasking) front-end would greatly enhance its usefulness.

All in all though, for thirty quid you can't really beat *Rhythm Box*.

### CREATIONS DISCS

For those of you who do not have a sampler, EMR has put together a set of *Creations* discs that contain selections of different sampled noises and sound effects for £19.95 a time.

There are 10 discs in all (and probably more by the time you read this) containing among other things, a complete set of percussion effects and an interesting collection of animal and human noises.

All samples are in EMR's Waveform Filing System format and can be loaded into any of the packages including *Rhythm Box*. Incidentally, *Creations* disc sound effects can also be loaded directly into Clares' *Armadeus*.

Rhythm Box *costs £29.95 from* EMR, *14 Mount Close, Wickford, Essex SS11 8HG. Tel: (0702) 335747*

# 24 PIN SALUTE

**Continuing our comprehensive guide to 24-pin printers, Malcolm Brown tests eight more machines for speed, clarity, design and price**

There is a wide range of 24-pin printers available for BBC micro and Archimedes owners. Last month we looked at five models in detail. Here eight more come under scrutiny with a complete comparison table of all the salient points on all these and other models tested before in *BBC Acorn User*.

As if to prove how volatile the printer market is, since last month's piece, Star has reduced the price of the LC24-10 to just £299 – making it the cheapest 24-pin printer around and amazingly good value.

Meanwhile, seven other machines have been through the *BAU* testing grounds.

## Citizen Swift 24

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COURIER SANS SERIF
ROMAN PRESTIGE

A good one to start with. Not only is the Swift 24 almost the cheapest 24-pin printer around, it offers an amazing collection of features too.

When it comes to construction, the £389 Swift 24 is a little on the plastic side, but Citizen is confident enough to give it a two year guarantee.

The print from the Swift 24 is good. Draft print is dotty but very open and readable. NLQ print is excellent, a bit dotty but dark and nicely formed.

Four NLQ fonts are provided and further fonts can be added on cards for £35 a time. All the fonts can be printed in shadow, outline and reversed to further add to the possibilities.

For this price the Swift 24 is quite fast too. It can print a page of NLQ text in a little over a minute; at 40CPS, faster than the Star LC24-10 looked at last month. Draft print is printed at 93CPS.

The tractor feed can be switched to either push or pull feed the paper, and automatic paper loading and paper parking are included.

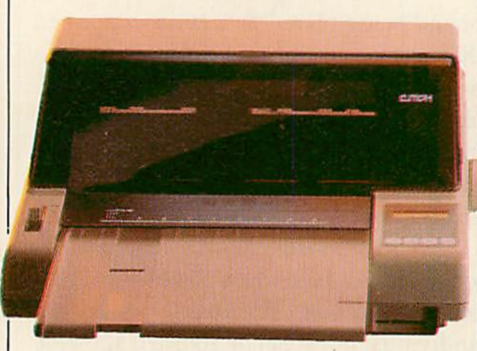
Both Epson LQ and IBM Proprinter compatibility is built in to the Swift 24, so all software should be happy.

Most unusual for this price is the front panel control. This includes an LCD display to tell you exactly what is going on (or going wrong) and to present the setup menu for selecting most of the printer's functions.

The non-volatile memory inside the Swift 24 can also store four 'macros' – separate setup configurations – which can then be called up with just a couple of button presses.

The Swift 24 packs a lot of printer into a small box and a remarkably small price.

## C-Itoh C-610



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If you thought the basic design of the dot-matrix printer had been pretty much sorted out over the years, then the £680, C-Itoh C-610 shows just where some lateral thinking can lead.

What sets the C-610 apart from other models is the way it treats the paper. The C-610 prints down onto the top of the paper as it is moved through the base of the machine remaining almost perfectly flat the whole time.

There is little advantage in this strange arrangement except that paper is fed in right side up, multiple copies (up to seven sheets at once) can be fed with less risk of them fanning out as they pass through the machine and the C-610 can happily print onto thin card.

To make matters even stranger, the C-610 prints different paper in different directions. Cut sheet paper is fed from the front – the most convenient entry point – and exits at the rear.

The tractor feed is at the back of the printer and fanfold paper enters there and feeds out at the front, printing fanfold paper in the opposite direction to cut sheets. This also means fanfold paper can remain loaded in the tractor feed while a few cut sheets are used. The control level is simply switched to which paper is being used at the time.

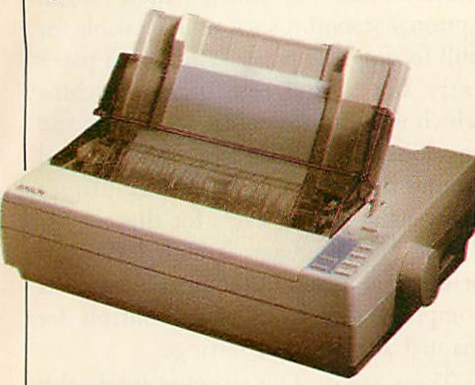
For all its peculiar paper handling, the C-610 is more ordinary in all other aspects. It is capable of a reasonable but pretty unremarkable speed of 87CPS in draft mode and it can manage 42CPS in NLQ mode.

The quality of print is quite acceptable in draft mode, but in NLQ mode, although dark and clear, it is rather more dotty than you would expect from a 24-pin machine.

However, the C-610 has a control panel to match its price. This includes a 16-character display to say just what is going on at any one time and this is used for setting up the printer – which means no fiddly Dip switches are used.

As far as actually using the C-610 goes, there is little to fault it. If the printing was better and its novel design less costly, the C-610 would be a good buy as well as a talking point.

## Epson LQ-550



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ROMAN SANS SERIF

The LQ-550 is an update on the older LQ-550 for the same price of £399. The differences between old and new are small and unfortunately the speed of the printer has not been uprated.

Like most Epson models, this is a solidly built machine. A push feed tractor unit is provided and unlike the LQ-500, this needn't be removed for use with cut sheet paper. Paper parking is also now included for easy switching between paper types.

Automatic paper loading is triggered from a front panel button and it is very smooth and efficient, coping with all reasonable thicknesses of paper without ever catching or feeding crooked.

The LQ-550 is only Epson compatible but it is the latest version of the LQ standard. This provides all the IBM graphics characters and symbols (except the card suits) and even outline and shadow versions of the fonts.

However, it cannot produce the full IBM characters set in italics. Only the extra characters or italics can be printed.

The LQ-550 is reasonably fast for this price range. It can produce a good quality NLQ print at 40CPS – about a minute for a typical page and much faster than the cheapest 24-pin printer, the Amstrad LQ3500 – and draft at a respectable 97CPS which is under 30 seconds for a page.

The NLQ quality is excellent and as well as the normal typewriter look alike style of NLQ text (which Epson calls 'Roman') the LQ-550 can also print in 'Sans Serif' – a plain font.

If you want, further print styles can be added with a plug-in cartridge with seven extra styles selected with a rotary switch on the cartridge.

The Epson LQ-550 is a typical Epson machine – good quality and reasonably fast – without any flashy gimmicks but solidly built to last.

## Facit B1400



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Not a 'famous name' but the £395 Facit B1400 is firmly at the budget end of the 24-pin printer market. Sadly, this is clearly reflected in the quality of its construction. Despite its interior metal chassis, the B1400's rattly plastic fasciae and weak acrylic covers do not inspire confidence and its longevity.

The quality of print, however, is pretty good. The draft characters are easily readable and NLQ is dark and crisp but still fine.

However, the speed of this machine also leaves much to be desired. In NLQ mode the B1400 manages only 33CPS, not as bad as the Seikosha SL-80AI but nearly a minute and a half for each page.

In Draft mode, again, it is slowest (excepting the SL-80AI) at only 77CPS.

Unlike most other 24-pin printers, the B1400 offers just one NLQ character style. There are no others built in nor can this machine take cartridges offering extra styles.

Like the SL-80AI, the tractor feed unit is removeable and must be taken off to use cut sheet paper. Even the automatic paper loading for sheet paper is tediously slow. It is genuinely faster to load the paper by hand than to wait for it to be wound automatically to the start position.

The B1400 is only compatible with IBM Proprinter control codes and so it misses out on a few of the flexibilities offered by the Epson LQ standard.

Although it is relatively cheap, the B1400 offers very little that cannot be found in other machines which have additional useful features.

## Fujitsu DL-3300



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The £599 DL-300 is similar to Olivetti's DM250. It is mechanically identical with some slightly different software. There is a wide carriage version, the DL-3400 for £740 and this is the same as Olivetti's DM250L.

The best features of the DL-3300 is the quality of the NLQ print. This is excellent – dark and crisp – with a fineness that makes it quite hard to tell it apart from typewritten.

Just the one NLQ font is provided built-in but extra fonts can be plugged in on £69 'smart card' cartridges. Each card holds two styles.

This printer has two 'draft' print qualities, one a little slower and better quality than the other. However, the difference is small so most users will stick to the faster draft for its speed and use the NLQ when looks are important.

The DL-3300 is not as fast as its price might suggest. In NLQ mode it takes almost a minute to complete a page.

The DL-3300 offers several control code emulations. It is compatible with both the older IBM Graphics printer and Epson FX standards, but only the newer IBM Proprinter. Strangely, it cannot use the Epson LQ control codes.

Diablo daisywheel printer emulation is also provided in the D1-3300 but the Olivetti versions do not offer this.

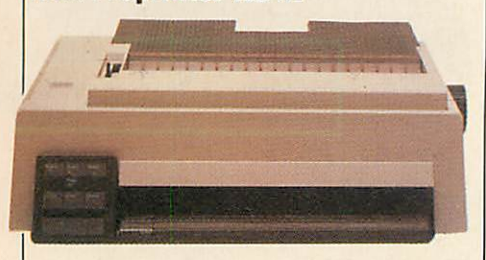
The front panel controls on the DL-3300 are comprehensive to say the least. Two pre-programmed set-ups can be stored in the printer's non-volatile memory and recalled with a couple of button presses.

The set-ups are programmed with a menu printed on paper and two keys on the front panel used to 'point' the printhead at the selection required.

This is a simple system to use and removes the need for an LCD display to indicate the selections but it does require paper in the printer at the time.

The DL-3300 is a capable machine with all that's really needed in a 24-pin printer but it is really too slow to justify its price.

## IBM Proprinter X24E



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The £664 Proprinter X24E demonstrates the price-rises inevitable with a 'name brand' product. To be fair the Proprinter X24E does have several features to justify going over to 'the other side' for a printer.

The Proprinter X24E both looks like an IBM PC and is as solidly built. A wide carriage version (the Proprinter XL24E) is also available for a hefty £810.

Cut sheet paper is loaded into this printer from the front, making positioning the paper quite tricky.

There is no automatic paper loading as the paper is almost in the right position for printing as soon as it is placed in the printer. Only a couple of presses on the line feed is required. However, it is difficult to tell exactly where the paper is without removing the printer cover so all in all loading sheet paper accurately is not a quick job.

A rear-fed tractor feed is also provided and this uses an ingenious automatic slow feed for loading the first sheet.

Paper parking means switching between single sheet and fanfold paper is quick and easy.

The draft print from this machine is fairly awful. In NLQ mode the print is much better but not up to the standard of some other 24-pin machines.

What's more, this machine cannot produce italic NLQ text (that is not in the IBM Proprinter standard).

Just one NLQ character style is provided and no cartridges are available for additional styles. Users are expected to download these from a PC and IBM produces a disc with a selection of 11 styles to choose from – not much use for Beeb or Arc owners.

However, the Proprinter is extremely fast. It can print a full page of NLQ text in about 40 seconds. A page of draft text takes just 15 seconds. No other 24-pin machine under £1000 can match that.

Of course, only IBM Proprinter codes can be used with this machine and unless you are exclusively using a Master 512 or the Arc PC emulator, this can be a bit of a restriction.

Every feature of the printer can be controlled from the front panel but many functions require complex series of button presses with one hand and the manual in the other, listening for the requisite number of beeps.

The Proprinter is overpriced and perhaps best left to those IBM users used to paying over the odds for computer equipment. However, if speed is the be all and end all, it must be admitted the Proprinter has the edge.

## Oki Microline 390



♥♦♣♠!"#$%&'()*+,-./01
23456789:;<=>?@ABCDEF
GHIJKLMNOPQRSTUVWXYZ[

Another more obscure make, the £599 Oki Microline 390 is expensive but very well made. Although outwardly plastic, this printer hides a strong metal chassis inside. Unusually, even the covers and paper guides are strong.

The print quality is excellent with almost no sign of the individual dots which make up each character.

This printer is also on the fast side. It can print draft text at 128CPS – around 20 seconds a page. In NLQ it is of course slower but can manage a healthy 54CPS (about a page and a half per minute).

The Microline 390 would benefit from some alternative NLQ character styles built-in. Smart card cartridges with extra fonts can be plugged in for £40 a throw.

The 390 has a push feed tractor feed and paper parking for switching to friction feed. Unusually, there is an optional second tractor unit available for pull feeding the paper. This uses a paper entry slot at the base of the machine which is useful for continuous labels and envelopes as they do not have to bend around the roller but it is difficult to see many users paying extra for this.

The Microline 390 is both IBM Proprinter and Epson LQ compatible and has comprehensive front panel controls for manual alteration of settings.

There are no Dip switches inside this machine. Instead, non-volatile memory stores the relevant switch-on settings and these can be altered with a printed menu system accessed from the front panel.

It can be tedious stepping through several unwanted options just to alter the one you want, but it's easier than trying to remember which switch controls what function.

For professional use, the Microline 390 is well worth a look. Although a little basic, it is extremely well made and fast.

## Seikosha SL-80AI



Seikosha's offering for the 'less than £400' market is a little sad.

This printer has a distinctly cheap feel about it. It does not look as though it will stand much heavy use.

The tractor feed unit is clipped onto the machine in a tacky way and it is a paper wasteful pull feed type. Annoyingly, it must be removed for friction feeding cut sheet paper.

The SL-80AI has efficient automatic paper loading and produces reasonable quality NLQ print, but it is slow and ponderous. This printer seems to pause to think about each line of text before printing. Even feeding the paper at the end of a page is visibly slower than on other machines.

## PRINTER COMPARISON TABLE

| Make & Model | Price (+VAT) | Print width | Claimed speed (draft) | Claimed speed (NLQ) | Average Speed (draft) | Average Speed (NLQ) | Interface Centr. | Interface RS232 | Sheet Feeder | Auto Load | Emulations Epson | Emulations IBM | Built-in fonts | Plug-in fonts |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amstrad LQ3500 | £249 | 80 | 135 | 62 | 64 | 31 | • | | | • | • | • | 1 | |
| Amstrad LQ5000di | £399 | 136 | 240 | 80 | 119 | 48 | • | • | | • | • | • | 1 | |
| Citizen HQP-40 | £559 | 80 | 200 | 66 | 114 | 46 | • | • | £150 | • | • | £50 | 1 | £35 |
| Citizen HQP-45 | £669 | 136 | 200 | 66 | 114 | 46 | • | • | £220 | • | • | £50 | 1 | £35 |
| Citizen Swift 24 | £389 | 80 | 160 | 53 | 93 | 40 | • | £25 | £84 | • | • | • | 4 | £35 |
| C-Itoh C-610 | £680 | 80 | 200 | 66 | 87 | 42 | • | • | £180 | • | • | • | 1 | |
| Epson LQ-550 | £399 | 80 | 150 | 50 | 97 | 40 | • | £36 | £79 | • | • | | 2 | £55 |
| Epson LQ-850 | £659 | 80 | 220 | 73 | 136 | 57 | • | • | £165 | • | • | | 2 | £55 |
| Epson LQ-1050 | £849 | 136 | 220 | 73 | 136 | 57 | • | • | £195 | • | • | | 2 | £55 |
| Facit B1400 | £395 | 80 | 135 | 45 | 77 | 33 | • | £40 | | • | | • | 1 | |
| Fujitsu DL-3300 | £599 | 80 | 240 | 60 | 115 | 49 | • | £25 | £166 | • | • | • | 1 | £69 |
| Fujitsu DL-3400 | £740 | 136 | 240 | 60 | 115 | 49 | • | £25 | £173 | • | • | • | 1 | £69 |
| IBM Proprinter X24E | £664 | 80 | 240 | 80 | 169 | 65 | • | £48 | £155 | | | • | 1 | |
| IBM Proprinter XL24E | £810 | 136 | 240 | 80 | 169 | 65 | • | £48 | £155 | | | • | 1 | |
| NEC P2200 | £395 | 80 | 140 | 47 | 82 | 34 | • | £60 | £67 | • | • | • | 4 | £33 |
| NEC P6 Plus | £649 | 80 | 220 | 75 | 130 | 56 | • | £85 | £125 | • | • | | 6 | £45 |
| NEC P7 Plus | £839 | 136 | 220 | 75 | 130 | 56 | • | £85 | £150 | • | • | | 6 | £45 |
| Oki Microline 390 | £599 | 80 | 210 | 65 | 128 | 54 | • | £45 | £130 | • | • | • | 1 | £40 |
| Oki Microline 391 | £789 | 136 | 210 | 65 | 128 | 54 | • | £45 | £180 | • | • | • | 1 | £40 |
| Olivetti DM250 | £649 | 80 | 240 | 60 | 115 | 49 | • | | £179 | • | • | • | 1 | |
| Panasonic KX-P1124 | £399 | 80 | 160 | 63 | 94 | 40 | • | £69 | £119 | • | • | • | 5 | |
| Seikosha SL-80AI | £349 | 80 | 120 | 40 | 53 | 26 | • | | £90 | • | • | • | 1 | |
| Seikosha SL-130AI | £525 | 136 | 180 | 60 | 93 | 49 | • | | £130 | • | • | • | 7 | |
| Star LC24-10 | £299 | 80 | 142 | 47 | 90 | 36 | • | | £65 | • | • | • | 4 | £49 |

The draft speed is only 53CPS and the NLQ speed 26CPS – over a minute and a half for a typical page of text. This is the slowest of all the 24-pin printers.

Strangely, when draft mode is selected from the front panel, control codes from the computer cannot overide it to put the printer into NLQ mode.

The SL-80AI is both Epson and IBM compatible and can manage most of the basic printing effects. There is no 15 and 7.5 characters per inch (CPI) text size as is found on most printers and strangely the SL-80AI cannot produce condensed print (17 and 20CPI) in NLQ mode. Some other printers suffer from this too but they print condensed draft print when condensed print is selected in NLQ mode. The SL-80AI just ignores the command.

Compared to the more expensive SL-130AI, this printer is not up to much. The quality is reasonable, but it's slow and has several rather silly design points.

## All in all

It is not possible to point to one particular model and say this is the printer everyone should have. Certain models do stand out. The Oki Microline 390 is well made and suitable for really professional use. The P6 Plus from NEC offers speed and a good range of features. The Amstrad LQ5000di offers a wide carriage printer for less than most 80 column machines. The Citizen Swift 24 is good value with all the features of the other 'cheapies' and some normally reserved for dearer models.

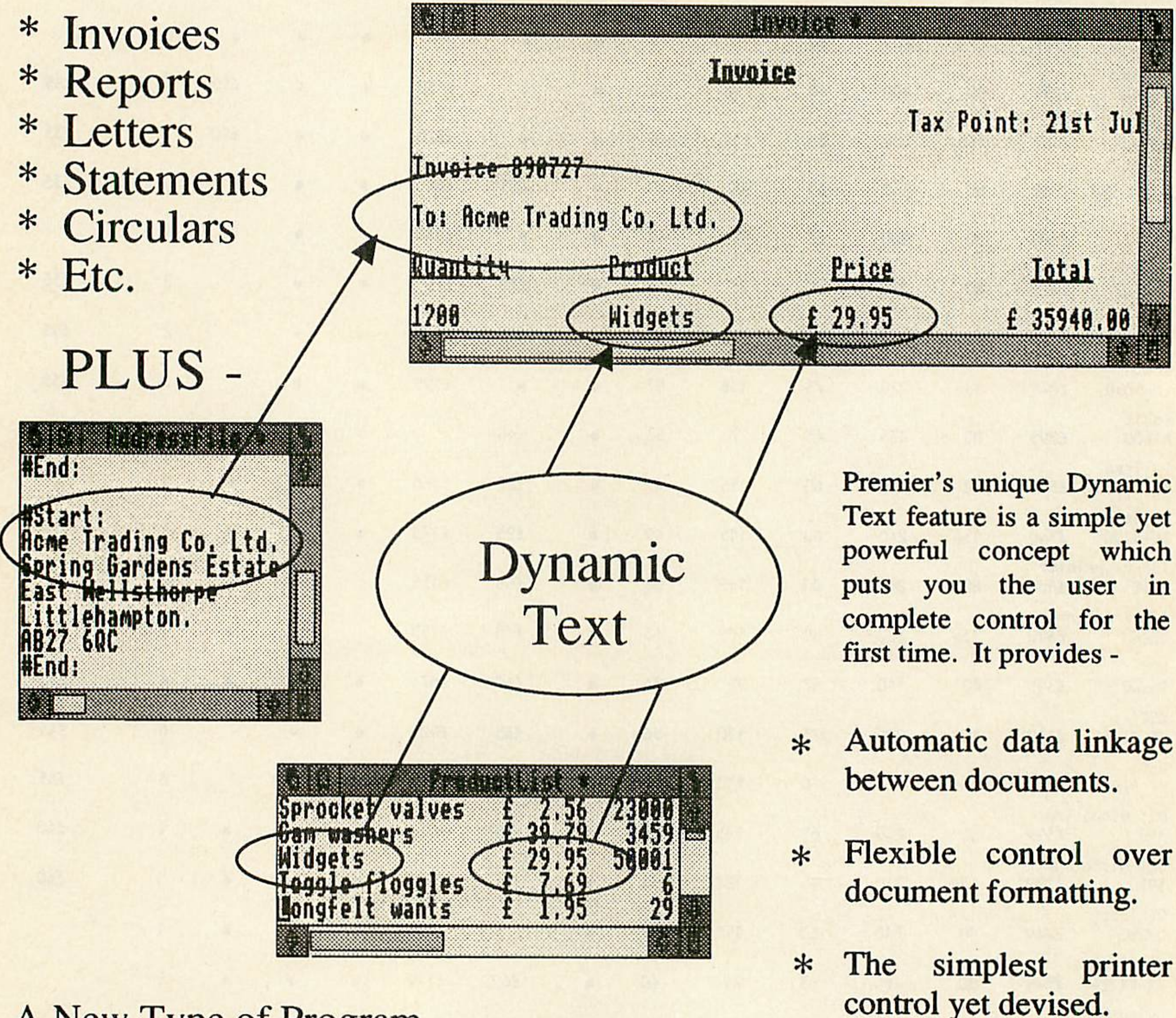
However, in the end the choice is bound to be a personal one, influenced by factors such as the cost of add-ons such as font cartridges and sheet feeders, local availability and discounting.

The only universal truth to emerge is that there are now a great many 24-pin printers available and one is surely right.

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Premier 3 may be purchased directly by phone, quoting your MasterCard (Access) or Visa card number, or from your nearest Acorn dealer. Educational discounts and multi-machine licences are available.

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# PRETTY IN PRINT

**Dave Futcher stretches his imagination with this text printing package from 4Mation**

*Dave Futcher*

Educational software house, 4Mation, has made quite a name for itself with novel and clever educational software. The latest in the line is *Stretch*, a superb text printing utility.

*Stretch* offers sign and poster design with mixed character fonts and symbols, different colours for outline and fill and a chance to rotate and reflect characters.

The package comes with 16 blocky, bold text fonts with descriptive names like 'Crack', 'Tilt' and 'Banana'.

A couple of the font styles are particularly interesting. 'Duotone' has a two-tone fill and the two shadow fonts 'Shad-Hi' and 'Shad-Lo' are upper and lower case respectively, with pairs of letters in each font so both shadow and outline are included. Two symbol fonts provide a useful collection of arrows, pointers and lines. There are even pictures of birds, animals, a telephone, television, printers and keys.

## On screen

*Stretch* loads into sideways Ram and is controlled with the keyboard, mouse or trackerball. Designs are made up on the work screen with editing operations controlled by a set of icons down the right hand side.

At the bottom of the screen is the character strip displaying 16 of the characters in memory. Characters required are selected from here with the pointer and positioned on the work area.

Characters can be placed anywhere on the screen but a line-up grid can be switched on or off for assistance. Before fixing, they can be stretched horizontally or vertically to one of 16 different heights and widths. They can also be rotated through 90 degree increments or reflected to give a mirror image.

A letter is then fixed but it can be repositioned by pointing at the letter again and pressing the DELETE key.

You can mix fonts to suit the subject and similarly you can alter fill or outline colours or shading to meet the requirements of the display.




Stretch – something to offer everyone

Twenty two work screens is the maximum allowed for printing. They can be scrolled through by using the double arrow icons under the number window. The preview displays the text in a reduced form across the top of the screen.

Editing can be done on the work screen but it is a question of deleting mistakes and re-doing.

The preview screen offers far more scope. Block operations permit the moving and re-alignment of text.

## Font editor

The collection of fonts provided is outstanding and enough for most people's needs. *Stretch* also includes a font editor.

This editor is totally different to other Beeb character designers. *Stretch* uses 'outline' fonts, like Postscript.

You first start with a square which forms the character embryo and you then simply manipulate 60 drag points to make the character.

## Printing

The program is well provided with printer drivers. Epson 9-pin and 24-pin compatibles are well catered for. So too are the Integrex and Canon inkjet printers and Epson JX standard.

Waiting for printing programs to complete their work can be frustrating but the 4Mation routines are fast. Also, for those who cannot bear to go away while the printer is at work, *Stretch* gives you a regularly updated estimate of how long the printing is going to take.

Since *Stretch* uses mode 1 you are able to use three colours and white. On a mono printer the colours need to be carefully selected in order to give a contrasting dot pattern. It's actually a good idea to print a test strip in different colours to assess what suits both your printer and your needs best.

Although *Stretch* has its own printer routines, it can also be teamed up with 4Mation's *Snatch*, especially if you want to print a piece of text quickly. *Snatch* and *Stretch* will work quite happily together provided you have four banks of sideways Ram available.

## Using Stretch

The manual that accompanies the software is outstanding. It contains lots of explanations. As well as hints and tips, there are plenty of suggestions for use.

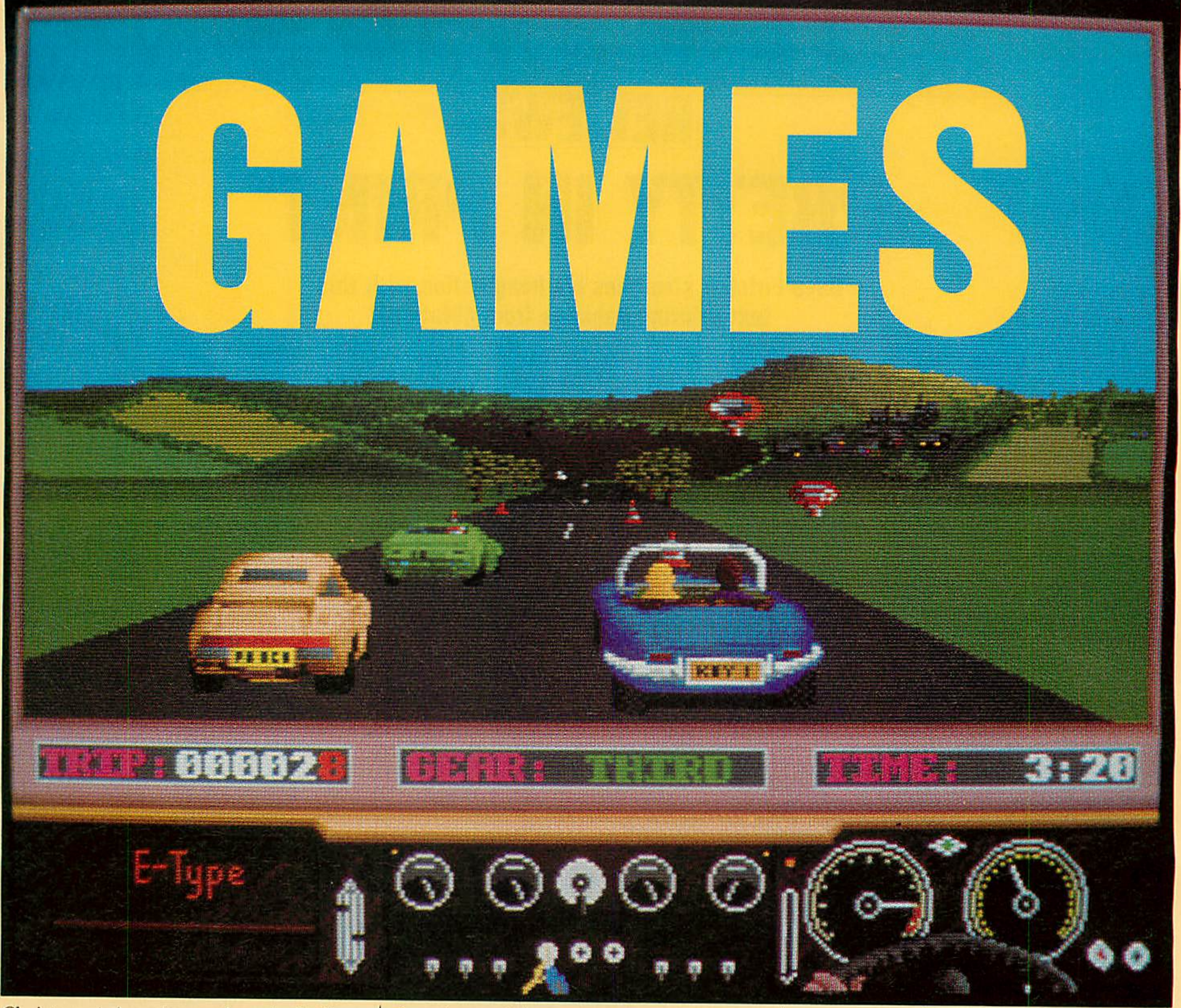
*Stretch* is a real tool for anyone who has to produce posters or placards, make notices or signs. It is not only a package for schools. Any organization or individual producing messages or displays will find the program useful.

Of course *Stretch* will be a real boon in any school. It will revolutionise the displaying of children's work. No longer is it tedious to make large headings for classroom displays. *Stretch* can quickly create bold, striking and colourful large headings. It will also find a place in titling up areas of a larger display and even individual children's work.

It is equally effective for use in producing small labels, or even badges where the printed pieces are attached to card and covered with clear transparent sticky plastic.

This package is very straightforward. In its own way it is extremely powerful and many BBC users will find a great use for it. At just £23 it will not stretch anyone's finances too much either!

Stretch *costs £23 from 4Mation Educational Resources, Linden Lea, Rock Park, Barnstaple, Devon EX32 9AQ.*




Christmas is looming, so how is the letter to Santa going to look this year? Well, visitors to the PC Show in September may have found the answer, particularly if they own Arcs. CDS will be writing versions of *Sporting Triangles* and *European Superleague* for the BBC and Archimedes machines, while Blade Software has offered *Laser Squad* for the Arc by Christmas. Krisalis Software has said an Arc *Manchester United Football Club* – a supreme version of Superior's soccer game – will also be available for Christmas.

The big money for Superior will probably come from *The Last Ninja II*. Being rather upset at losing his island to some guy in a black jump suit, the evil Shogun Kunitoki has wised up to the fact there are megabucks in the New York drug trafficking trade and has transported himself to where it's all happening.

So Armakuni (the last ninja) puts in an application to the Gods for a transfer too. So far it sounds like a cross between Crocodile Dundee and Star Trek IV.

How will he know what to do with the credit cards and computers, let alone the sewers – all part of the plot! In *Ninja II* you battle with more than one baddie at a time which makes it far more difficult then its predecessor but a good Ninja is never without his shiriken stars!

From The Fourth Dimension Archimedes department is *UIM* plus a *Holed Out* course designer (Arc only). Two games I haven't talked about before are *E-Type* and *The Olympics*. The former is the first racing simulation for the Arc and will feature five backdrops, a digitised walnut veneer dashboard, 256 colours plus a manual/automatic option on the gearbox (pic above). The demo copy I picked up at the show was excellent.

The latter boasts six Olympic events including pole-vaulting and skeet-shooting and the company's Steve Botterill tells me that rigorous keyboard bashing has been avoided wherever possible.

Stuart Gilson of Southampton has sent in a cheat for Minerva's *Orion*. It upgrades the old LUC plus SPACE from the high score table by altering the main program.

The easiest way to do this is to *UNPLUG SpriteUtils before auto-booting and then listing lines 760 and 810 when it throws up an error. At the end of each line is the number 03. Try changing these before entering *RMREINIT SpriteUtils and finally RUN.

I've had quite a few letters concerning the multi-user game *Bolo*. It seems there are a lot of people following the game through the computer press wondering when and where it will next surface.

I'm afraid the news is still that author Delos Harriman hasn't yet found a publisher but his hopes are high.

However, anybody desperate for a copy might try contacting him personally. If you send me your address I'll pass it on.

I received my copy of *Interdictor* two days ago and have been playing it since. Okay, I know all the PC/ST/Amiga owners will be the first to jump up and protest they have a much better flight simulator but frankly I'm not interested.

I know the game doesn't really exploit the Archimedes or have millions of fancy features – but I can certainly recommend it for Christmas, unlike some of the rubbish the undeserving Arc is receiving.

If you are one of the mass of people who've sent in high scores, don't worry, I haven't lost them. I'll be running an updated high score table early next year.

Next month is the final issue before Christmas and in traditional manner, I shall be informing you of my personal selections for the top games of 1989.

**Sam Greenhill**




**Superior Soccer. Superior Software, BBC B/Master 128/Electron cassette £9.95, 5.25in disc £11.95, 3.5in disc £14.95**

This latest offering from the formidable Peter Scott/Superior team puts you in the role of a football player/manager, combining on-the-field action with strategic planning just like the real thing!

In the arcade section where there's a one or two player option, you play a series of league games. Fortunately, you don't need 11 pairs of hands as you always control the player nearest the ball (with the exception of your goalie, who's looked after by the computer).

All the action takes place within a window which shows an area around the ball, just like on the telly. For a wider view, there's also an overview of the full pitch, a clock, the current score and the manager's comments.

With five keys for each player, I was pleased to discover that all keys are redefinable. Nevertheless, it takes time before pressing combinations of them for manoeuvres such as long and short passes, kicking the ball into the air, sliding tackles and headers, comes easily.

The management side of running the team is as closely linked to the field action as in real life.

Your chosen team starts off in Division 4, with the objective of becoming Division 1 League Champions a long term goal! After 11 league games you've played all the teams in your division, the season's over and the top two teams are promoted while the bottom pair are relegated.

For the manager, everything hinges around money with your team's earnings depending on which division you've reached and the size of crowd you attract. The main management skill lies in buying and selling players and in careful team selection. For example, players who aren't rested become tired, while teams which aren't rejuvenated by new players become jaded too.

Playing *Superior Soccer* successfully requires an outstanding combination of manual dexterity and quick thinking along with the ability to formulate and implement long-term plans, which coupled together make a good game.

**Bernard Emblem**

**Jinxter. Hyperpack 2 (£89.95) from Cambridge International Computing.**

Over six months has passed since I reviewed *Fish!* in the April issue of *BAU*, with any luck long enough for you to have finished the game because the next Magnetic Scrolls adventure, *Jinxter*, is now available.

The scenario is nothing new. The evil Green Witches, under the rule of Jannedor Nasty have stolen the magical bracelet of Turani, removed its charms and scattered them about the realm of Aquitania and are now threatening untold chaos!

The good guys, the Guardians, headed by Len Wossname, are, needless to say, a little put out partly due to all the impending doom but mostly from the lack of a decent cheese sandwich ...

Anyway, guess who's been 'asked' to




save 'the world from this terrible threat?

The game starts off quite 'normally' on a bus. You must first work out where to get out, then you can explore your house and garden. The locations here may seem a little mundane, but some strange things happen!

Later on, you can ride a very realistic carousel, get intoxicated in the pub, go diving, meet weird people, do battle with the hideous Postmistress and even control the weather before finally arriving at the Witches' castle and killing Jannedor.

As with all Magnetic Scrolls' adventures, the location descriptions are highly detailed, the illustrations stunning and the text parser very versatile. It's nice to type in 'REMOVE MASK, FLIPPERS AND WET SUIT, DROP THEM AND THE AQUALUNG' and have it executed correctly.

The puzzles in *Jinxter* are quite tricky, more so than *Fish!*, but all have logical solutions. As with *Fish!*, puns are liberally scattered throughout the text so make sure you examine everything you see!

*Jinxter* is definitely my favourite of all Magnetic Scrolls adventures and I can recommend it to any adventure nut.

**Dave Lawrence**

**Licence to Kill. Domark, BBC disc £14.99, cassette £12.99**

If you're one of those people who is under 15 and hasn't seen the latest Bond film, *Licence to Kill*, then make a point of doing so at some point.

Sadly however, I cannot grant the same advice for the game. While it looks a treat on the 16-bit computers, the Beeb has suffered once more the humility of coming bottom of the list of priorities on Domark's agenda.

It's all in monochromatic yellow (or white) and black, which stings unless you turn the contrast down.

There are six parts to the game which separate it into individual sub-missions. Each mission has a different objective, but they are all remarkably similar.

Bond can shoot in all directions (including backwards, even when he's running forwards). At first, this is tricky to master but becomes an advantage in part two when foes lurk behind wooden crates with machine guns, even though they fire slow-moving square bullets that appear to have a slight hint of homing!

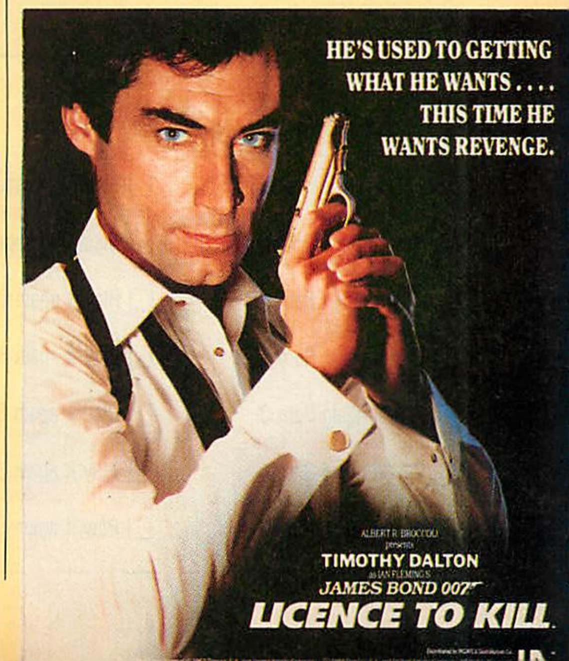
The graphics are too complicated for a two colour screen and the sound didn't exactly knock me off my feet. The action is all right, I suppose, but could be better.

The style of the game is old, but then so is the film and that still brings in the bucks. However, I don't think the Beeb version will.

When you compare the price of 15 quid to something like *Elite* or *Exile* which both sold for just £5 more, the result is unimpressive.

This type of game was appearing in newsagents five years ago priced £1.99. It's just not on any more.

**Sam Greenhill**



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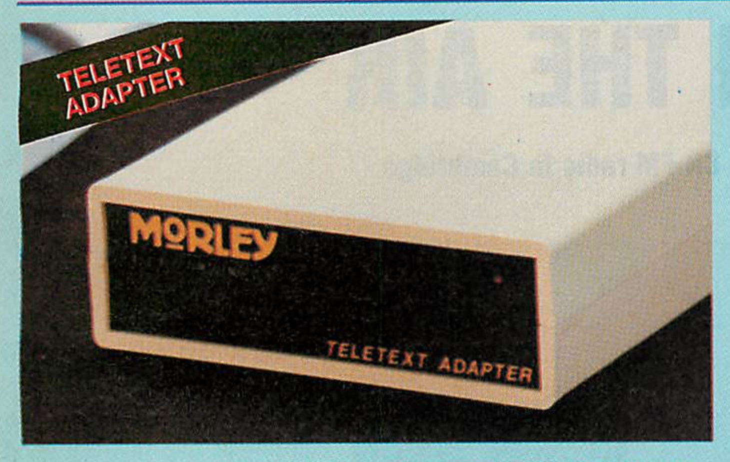
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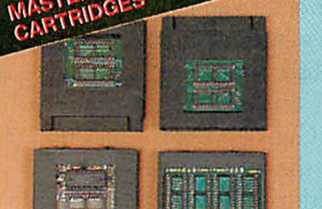
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END USER

# ARC ON THE AIR

**Sean Solle tunes in to CN-FM radio in Cambridge**

CN-FM 103's high quality stereo sound burst onto the Cambridge and Newmarket area's airwaves in February and, appropriately for a radio station in Acorn's home territory, an Archimedes plays a major role in the studios.

'It's three-twenty, you're tuned to CN-FM and this is Footloose...' Mike De Souza clicks a button on the mouse beside him, then switches off his microphone.

At the other end of the 10m mouse extension lead, behind the studio's soundproof glass, an Archimedes has started the compact disc spinning. Mike glances up at the screen beside him before taking off his headphones.



The 'footloose' Mike De Souza goes out over the airwaves

Grinning, he points back at the monitor which shows we have three and a half minutes before he's on air again.

The Arc, he explains, is treated just like any other piece of studio equipment. Surrounded by eight cartridge players, two Digital Audio Tape (DAT) machines, a pair of conventional CD players plus the mixing desk that brings them all together, it's easy to see what he means.

He quickly shows how the material for the rest of the afternoon's programme is selected by mouse from the week's playlist. News, travel reports and advert slots are all listed and displayed on screen. The duration of each slot is shown and counts down to zero once selected.

Noticing the current track is about to finish, Mike dons his cans once more and Ian Barfoot leads me through to his domain – the engineering department. In the workshop sits an A310 with hard disc and mono monitor. Connected to its RS232 port is an ASC serial multiplexer, through which the Arc drives a pair of Sony CDM006 multiplay units, like the CD jukeboxes found in pubs.

The interface allows additional multiplayers to be added to the system. The units each hold 60 CDs each which are picked up by a mechanical arm and slotted into the player.




The Arc sits supreme in the studio

It can take up to 30 seconds to replace a disc and select a new one, and the Arc warns presenters the disc will need to be cued up before play, enabling them to choose an alternative track from the other box if necessary.

Most of the discs contain up to 70 minutes of golden' tracks – recordings straight from the original masters compiled especially for radio stations. As the CDs are intended for computer controlled systems, the track details for every CD are provided on floppy disc and are easily moved onto the hard disc.

Ian has nothing but praise for the studio system. 'The only comparable setup is based on a touch screen system and costs in the region of £10,000 for the computer and software alone'.

'We haven't had a single problem with the computer so far and it hasn't been switched off since we first went on air. Letting presenters loose on equipment like this is a good test of its durability.'

The *Trackstar* software was written for the ASC system by Radio Broadland's engineer Brian Barr. The Arc displays the output schedule, logs all material played for royalty purposes and cues up the appropriate tracks. Presenters can still play chart CDs, particularly singles, on the two individual players in the studio and the Arc takes this into account.

The DAT machines are used for playback of the station's own jingles and eventually the Arc will be able to cue these as well. Intelligent Interfaces' dual serial port forms part of this expanded system and will also allow the 310 to be used as a terminal to display weather and traffic reports from the newsroom.

The actual playlist is generated by *Selector* running on an IBM System 36 machine in Peterborough. Given the appropriate information about the style and duration of a show, this will generate a suitable selection of music for the week. The database holds not only names and times of tracks but also the 'feel' – ensuring Guns N' Roses won't find their way into the breakfast show.

The setup was originally designed to download the playlist via a special high-speed datalink to an IBM PS/2 machine, where it would be printed out, and the schedule for each show decided from this.

At CN-FM the text file is instead loaded from a 3.5in PC format disc onto the Arc's hard disc using the PC emulator, ready for use by *Trackstar*.

Could the system be improved? 'Well, I suppose a tracker ball would take up less space in the studio,' pondered Ian, 'and once the machine's controlling the DAT players, things will be easier. Oh, and there's a third Jukebox on order. The 310 will cope with all of that.'

# THE MINERVA COLLECTION

## Archimedes Games

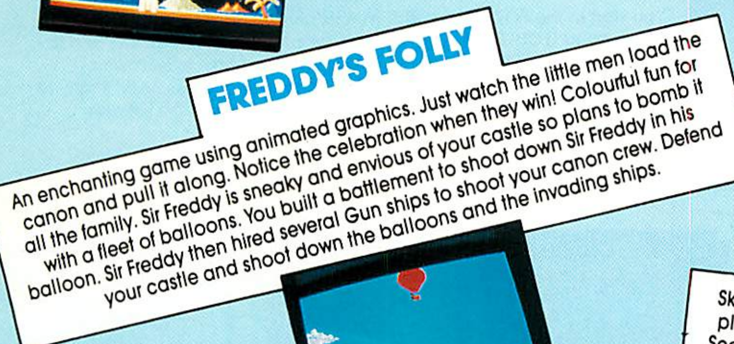
### JET FIGHTER

Alone on a forgotten planet you must defend yourself against all comers whilst rebuilding your broken rocket ship, then fuel it and take off to the next level. With the aid of your jet-powered backpack you move around to collect the various parts of the rocket. You must avoid collision with all other objects. Build and then fuel your rocket to take off to the next level. Absorbing fun for all the family.



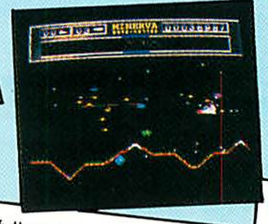
### THUNDERMONK

An intriguing new game with a variety of ways to achieve the ultimate goal of recapturing the Lonesome Monk's Monastery from the grip of the Evil Demons. Lead The Lonesome Monk's army through the labyrinths of the Monastery and recapture all the great treasures hidden in the building. Keep your eyes peeled for the secret passages. You too could walk through walls!



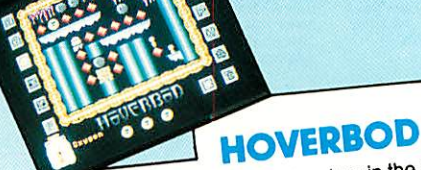
### FREDDY'S FOLLY

An enchanting game using animated graphics. Just watch the little men load the canon and pull it along. Notice the celebration when they win! Colourful fun for all the family. Sir Freddy is sneaky and envious of your castle so plans to bomb it with a fleet of balloons. You built a battlement to shoot down Sir Freddy in his balloon. Sir Freddy then hired several Gun ships to shoot your canon crew. Defend your castle and shoot down the balloons and the invading ships.



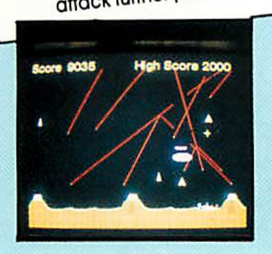
### ORION

Skillfully manipulate Orion, the latest air to air combat interceptor, to defend your planet against the tide of marauding aliens. Shoot them down before its too late! Score points by saving your men before they are changed into mutants -otherwise they will turn against you. Contains Baiters, Pods which explode into Swarmers and waves of Bombers. Orion is a fast and furious scrolling 'shoot em up' game based on the all time arcade classic.



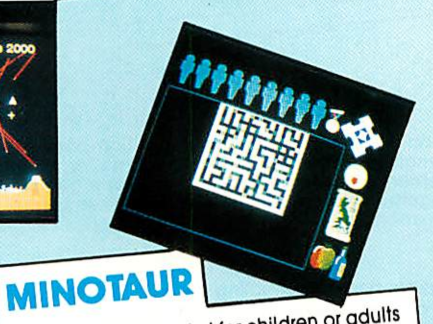
### MISSILE CONTROL

Missile Control is a classic arcade game written for the Archimedes to make full use of the advanced graphics and sound, while remaining faithful to the original concepts of the game. The Player is in control of the missile launches and must do the utmost to protect the cities from the incoming missiles. On each subsequent attack further planes, satellites or 'smart' missiles attack the target cities.




### HOVERBOD

Hoverbod is a traditional maze adventure in the style of the classic Manic Miner, yet it is of stupendous proportions. Hoverbod, the yellow sperical droid, has been banished from the planet Zingle and goes in search of some stolen treasure. The player must guide him through the perils which befall him and help him puzzle his way through the eight different levels to the final quest level. But beware . . . the Ibbles and Squibbles start to materialise!!!!



### MINOTAUR

The Minotaur maze game is aimed at a market for children or adults who want a game where quick shoot-out reactions are not necessary. Theseus walks around the Labyrinth, collecting items to assist in the search of the ill fated men which have been provided as food for the Minotaur. The ultimate aim is then to kill the Minotaur and lead the men out of the Labyrinth to safety. The maze size is fully definable by the User. Games may be saved and reloaded for use at a later time.




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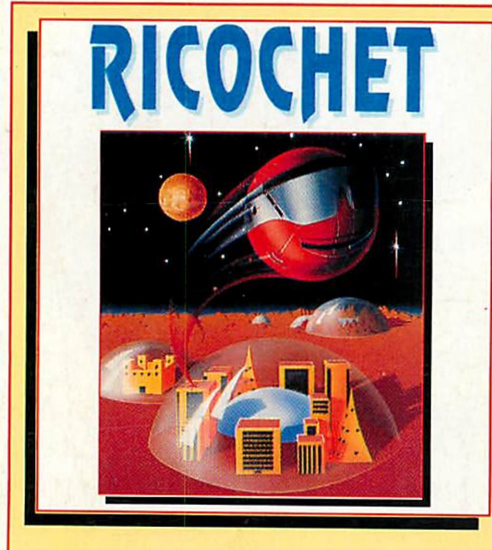


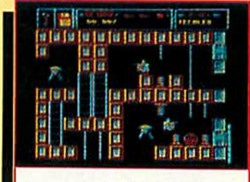

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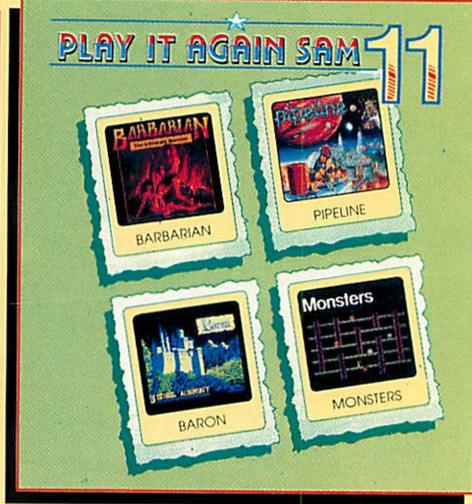
**PIPELINE**
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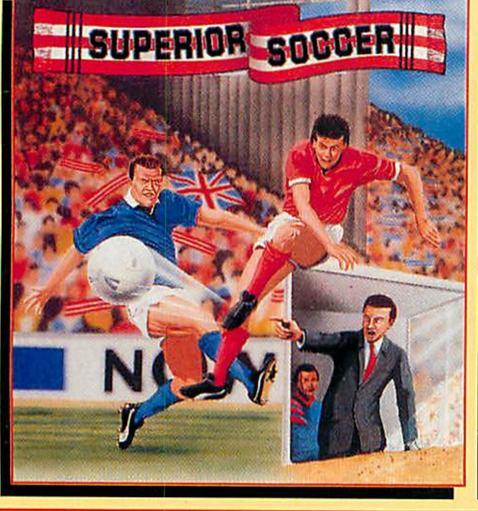
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